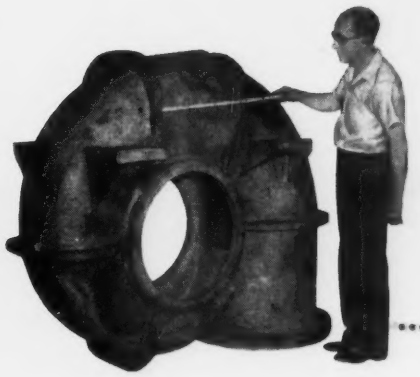
APRIL 1952

FOUNDRY

...WHEREVER METALS ARE CAST



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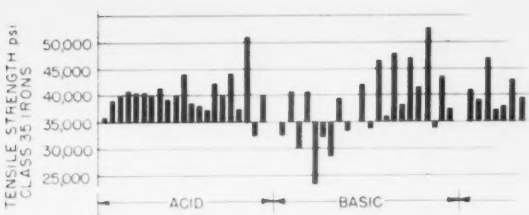

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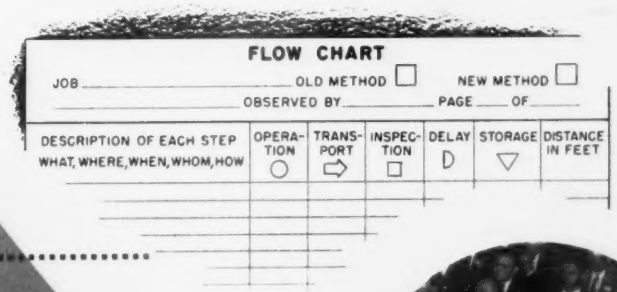

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MORE FINISHED CASTINGS PER TON OF METAL POURED

with

PURITE—100% Fused Soda Ash. The Scientific Flux for Better Melting and Cleaner Iron

PURITE—is sold by all leading foundry supply houses in the United States and Canada

Like so many modern foundries, the Stockham installation relies on Purite to help produce the quality iron needed for their valves and fittings. For cleaner, sounder iron castings...for ladle desulphurizing and as a cupola flux...Purite has proved its efficiency and economy by its industry-wide acceptance for nearly 30 years.
These exclusive advantages show why –

1. Purite produces a higher percentage of finished castings per ton of metal poured.
2. Purite gives 100% fluxing action in the cupola — 100% desulphurizing action in the ladle.
3. Purite gets to all the iron quicker.
4. Purite is time-tested and proven for unsurpassed desulphurizing uniformity.
5. Purite comes in 2-lb. pigs and 2-oz. tablets — no weighing or measuring required.
6. Purite is 100% pure fused soda ash — you do not pay for inert materials.
7. Purite does not crumble — no waste — no dust.
8. Purite can be shipped in bulk carloads at substantial savings over bag shipments — is easily stored without deterioration.

Purite can help you cut casting losses. Write for the booklet, "Refining and Desulphurizing Cupola Iron"; it illustrates in detail the accepted ways in which Purite is most effective. Mathieson Chemical Corporation, Baltimore 3, Maryland.

Stockham Valves and Fittings uses Purite in this 10,000 lb. mixing and desulphurizing ladle in their grey iron foundry. The cast iron pipe fittings and iron valve parts made from this iron meet the requirements of ASTM A-126, Class B.

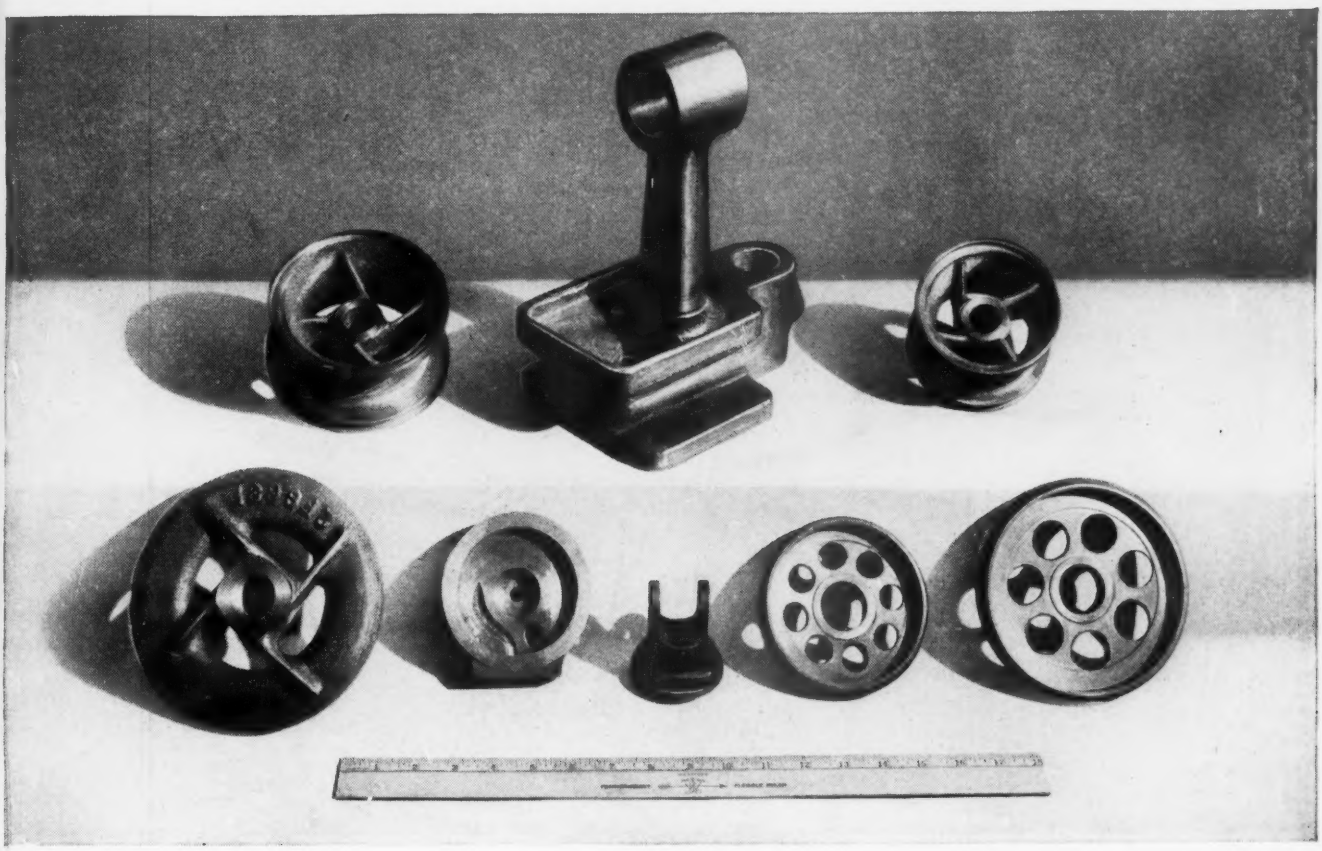
Mathieson
CHEMICALS

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

NISILOY*

to eliminate hard chilled areas in gray iron castings

. . . *REDUCE machining time, tool wear, rejections*



Produce *machinable* gray iron castings regardless of sharp variations in section thickness . . .

Eliminate localized hard areas or chilled (white) edges and surfaces . . .

Reduce machining time, tool wear and rejections . . . *raise both quality and quantity of your output by controlling gray iron structure with small ladle additions of NISILOY.*

Designed specifically to promote better machinability, NISILOY is a powerful innoculant and graphitizer containing about 60% Nickel, 30% silicon, balance essentially iron.

Trade Mark of The International Nickel Company, Inc.

EMBLEM OF INCO SERVICE
TRADE MARK

Mail the coupon now . . . for your *free* copy of a booklet that describes how Nisiloy helps you improve structure and machinability of gray iron castings.

THE INTERNATIONAL NICKEL COMPANY, INC.
Dept. TF, 67 Wall Street, New York 5, N. Y.

Please send me your booklet entitled,
"NISILOY" for GRAY IRON CASTINGS.

Name.....*Title*.....

Company.....

Address.....

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THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
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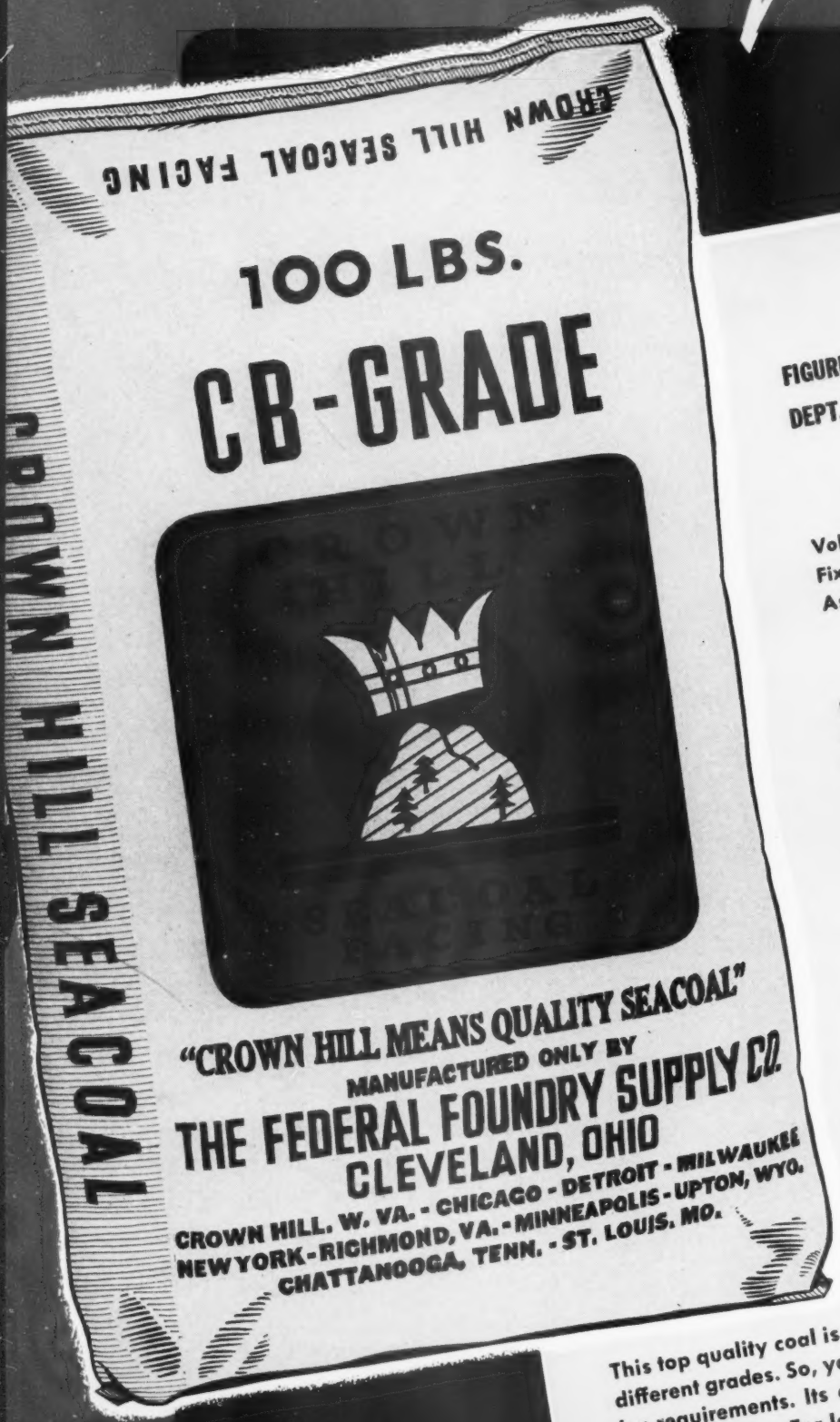
CROWN HILL MEANS *Quality* SEACOAL


CROWN HILL SEACOAL FACING
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CB-GRADE
"CROWN HILL MEANS QUALITY SEACOAL"
MANUFACTURED ONLY BY
THE FEDERAL FOUNDRY SUPPLY CO.
CLEVELAND, OHIO
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CHATTANOOGA, TENN. - ST. LOUIS, MO.
CROWN HILL SEACOAL

FIGURES FROM BUREAU OF MINES, DEPT. OF INTERIOR OF THE U. S.

(Moisture Free)

PROXIMATE ANALYSIS	
Volatile Matter	38.9%
Fixed Carbon	57.4%
Ash	3.7%
	100.0%

ULTIMATE ANALYSIS	
Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
	100.0%

Fusion Point of Ash 2980° F

The quick-flash coal used in producing CROWN HILL comes from the heart of the West Virginia bituminous coal region.

This top quality coal is carefully pulverized and screened into seven different grades. So, you're sure to find a grade to meet your particular requirements. Its quick combustibility induces faster escape of gas and steam. For lower cleaning costs and better finish—always specify CROWN HILL.

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 EAST 71st STREET, CLEVELAND 5, OHIO

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Mines—UPTON, WYO. · RICHMOND, VA. · ST. LOUIS · CHATTANOOGA · NEW YORK

APRIL 1952

FOUNDRY

VOLUME 80—NUMBER 4

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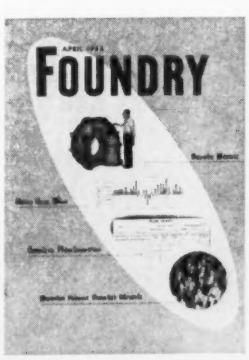

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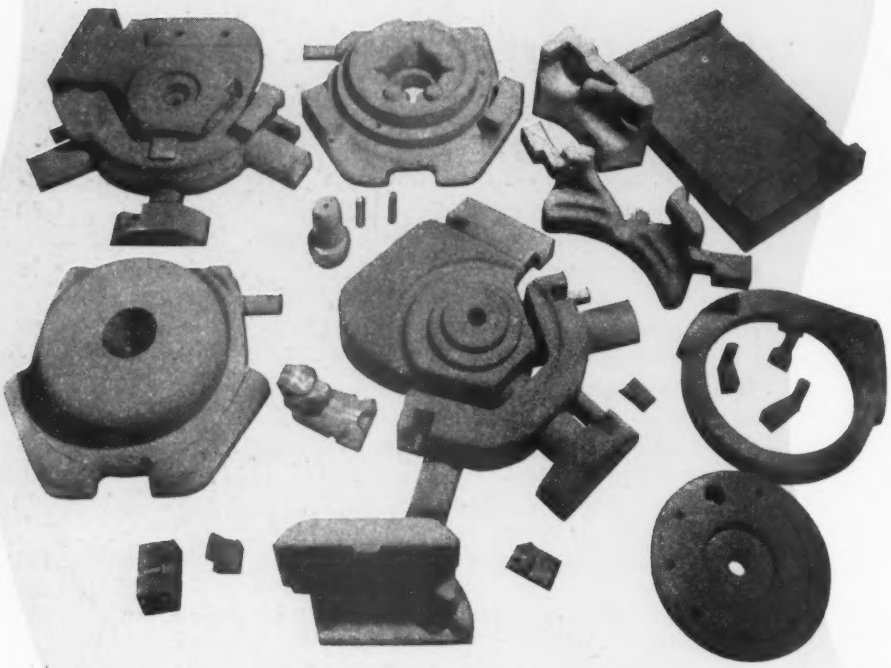
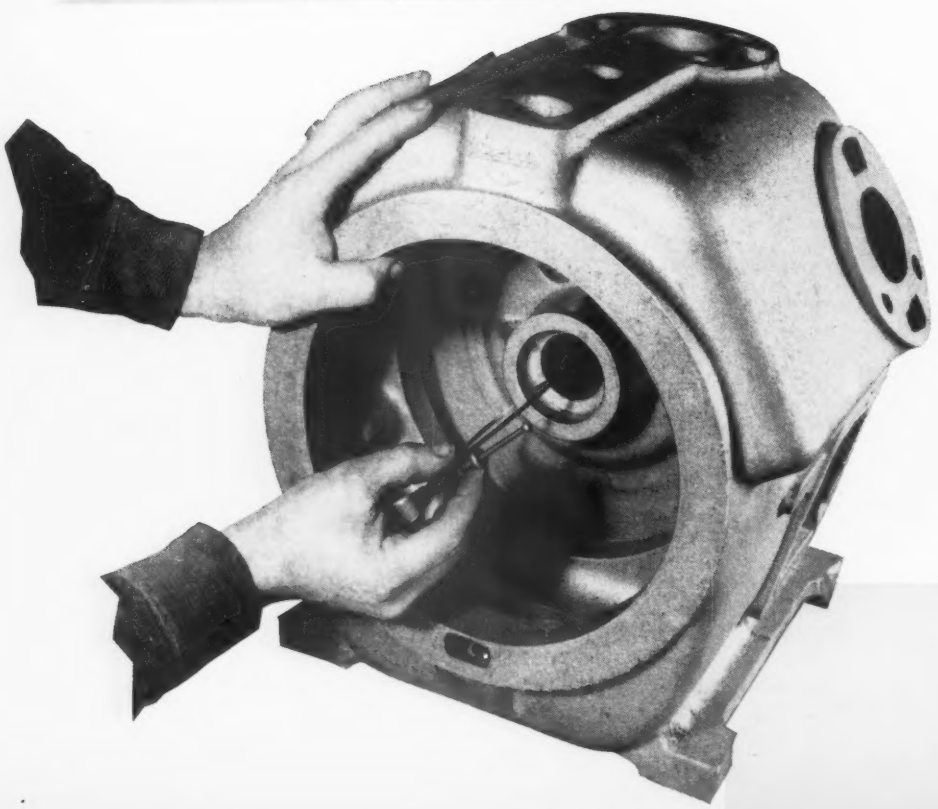
LINOIL uniformity

FOR "SUPERIOR" CORES



◀ • • • • Twenty-one small and medium cores used to mold compressor housing illustrated below. Cores are made to withstand 280#/sq. in. tensile strength.

FOR "SUPERIOR" CASTINGS



◀ • • • • • Casting for high pressure reciprocating air conditioning compressor. Interior surfaces must be true and free of flaws so that casting will withstand up to 900#/sq. in. pressure.

pays off at Superior Foundry, Inc.

CLEVELAND, OHIO, FOUNDRY HOLDS SCRAP FROM CORE FAILURE TO A MINIMUM

TOUGH ONES like this 21-core compressor housing are all in a day's work at this large production, jobbing foundry.

Admittedly, Superior likes complicated, multi-core jobs because their high-capacity core rooms have proven their ability to constantly produce cores as fast as they are needed on the molding floors.

The secret of their success is rigid foundry-wide standardization of methods, a policy which pays off, particularly in the control of sand mixtures. The result is phenomenal . . . rejects due to core failure are held to a minimum.

To maintain such a high degree of performance with widely-varied core sizes, Superior insists upon absolute uniformity of mixture ingredients. To help maintain these high standards, their core room supervisors rely on *uniform* LINOIL.

Why not test LINOIL in your sand lab or let an ADM engineer check your mixture. Our laboratories are at your disposal at all times.

"Sea" of tractor transmission case cores: example of the larger cores produced at Superior.

Complicated core assembly for lathe gear box is lowered into drag.

Have you heard about the New LINOIL 700 Core Oils?

Here are the facts: No matter what core oil you are now using, you can replace it with one of the newly-developed LINOIL 700 Series and get greater tensile strengths *at a lower cost.* The LINOIL 700 core oils are easy to work with, too. They're proving to be the best core oil buy in the history of the foundry industry. Ask your LINOIL man about the "700 Series"—or write for further information.

ARCHER • DANIELS • MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110th STREET • CLEVELAND 2, OHIO

ADVERTISEMENT

Let us prove Pangborn Air Blast Cleaning Rooms can

SPEED UP

cleaning of large castings!

IF cleaning large castings is a s-l-o-w process in your plant—*speed up* your cleaning operation with a Pangborn Air Blast Cleaning Room!

Work can be loaded or unloaded from *both* ends, and heavy, cumbersome castings are quickly and easily handled with either a car or overhead conveyor. Large castings are cleaned in a jiffy, assuring you a *smooth flow of work* from shakeout, through cleaning and on to grinding and inspection.

Pangborn has *job-proven* Air Blast Room designs to meet all cleaning requirements. Features include plenty of illumination on the work, automatic abrasive recovery which removes sand, refuse and dust *before* returning abrasive for re-use.

Pangborn engineers will be glad to show you case histories of Air Blast Cleaning Room installations . . . facts and figures that *prove* Pangborn speeds production and cuts costs. What's more, the tremendous know-how of these men is at your disposal to help solve *your* particular cleaning problem. For full details at no obligation, write to: PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md.

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn

BLAST CLEANS CHEAPER

with the right equipment for every job

If you haven't heard it . . .

IT'S NEWS!

WE STILL LIKE THE OLD PROVERB that says: "It ain't the things you don't know that gets you into trouble; it's the things you know for sure what ain't so."

* * *

NEVER UNDERESTIMATE THE POWER of a woman even if you are dealing with insects. According to recent reports, insect researchers testing a new bug-killer found that it kills exactly half the insects—the males.

* * *

FOR A CHANGE, why don't we blame the Indians for the mess this country is in? They should have been more strict about admitting so many trouble-making aliens.

* * *

ONE OF THE MAJOR INJUSTICES of this world is that it's never the girls who are cold who get the fur coats.

* * *

POEM: His mother led him by the hand — But now he's wed to Rose — Who guides him in a different way: She leads him by the nose.

* * *

IF YOU ARE WILLING TO TRAVEL 80,000 light years through space you can stake a claim to a right sizeable chunk of celestial real estate. Some of the stars in that neighborhood run up to a billion miles in diameter. They are 10,000 to 50,000 times as bright as our sun. The big problem is to find something solid to stand on: the star is not gas, less dense even than the best vacuum we can create on earth.

* * *

AN EXECUTIVE of one of our major air lines predicts that in 25 years turbo-jet or atomic planes will leave New York at 12 noon and arrive in Los Angeles at 12 noon—same noon.

* * *

SPEED IS INCREASINGLY IMPORTANT in this modern world because more than ever, time is money. This is especially true in industry where top production men long ago learned that modern machines pay off in profits by producing more, in less time (i.e., at lower cost).

* * *

A GOOD EXAMPLE is the NEW Pangborn Rotoblast Barrel, on display for the first time May 1st to 7th at the Foundry Show in Atlantic City. Be sure to see it there and watch for it in the Pangborn ads and news releases. Here is a brand new machine that can break blast cleaning bottlenecks and speed your production at lowest cost. It will pay you to study it carefully.

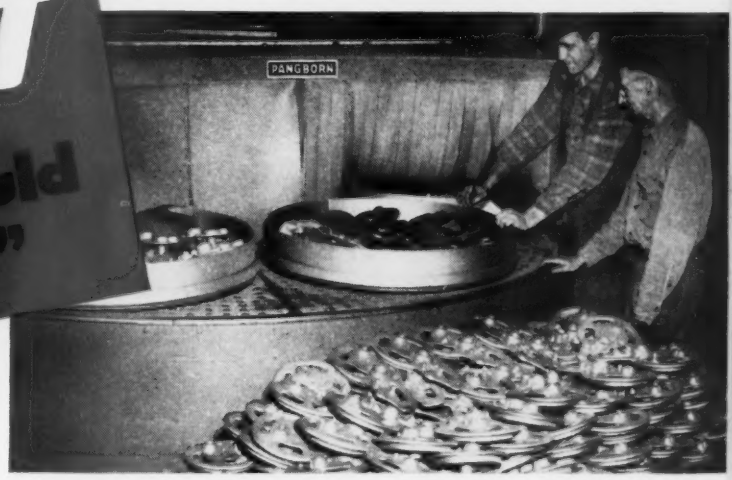
* * *

A LITTLE FLATTERY now and then makes husbands out of single men.

* * *

Two veteran Eclipse operators play "put and take." Castings are put on at one side for cleaning; are removed sparkling clean at the other side.

Eclipse Lawn Mower Co. reports "PANGBORN ROTOBLAST® proved it could do this for us"



Former skeptic Russell Brooks—shown here with Cleaning Room Superintendent Don Murray—no longer doubts the Pangborn LG ROTOBLAST Table's ability.

● **Clean 3000 castings in 4 hours without any breakage!**

● **Cut cleaning man-hours 42%—saving $2100 a year on labor alone!**

"I didn't think any blast cleaning table could clean our castings efficiently," says Mr. Russell Brooks, Asst. Cleaning Room Superintendent at the Eclipse Lawn Mower Co., Prophetstown, Ill. "I wanted proof! So we arranged for a demonstration at a nearby foundry where a Pangborn ROTOBLAST Table has been used for several years.

"Well, the demonstration was over and the castings perfectly cleaned before I realized it was started! I was sold! We ordered a Pangborn LG ROTOBLAST Table, with the idea of using it to clean about 50% of our castings. However, the performance of this table proved so superior that we now use it to clean almost our entire foundry output. We clean 3000 pieces in 4 hours . . . save $2100 a year in labor alone, plus additional savings due to the complete elimination of breakage. And, perhaps most important, we've licked the cleaning room bottleneck we had before!"

Find out how *you* can speed production and save money, too. There's a modern, economical, efficient ROTOBLAST *Barrel, Room, Table,* or *Table-Room* especially designed to solve every blast cleaning problem . . . including *yours!* For the complete facts, write today for Bulletin 214. Address: PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md.

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn

BLAST CLEANS CHEAPER

with the right equipment for every job

ROTOBLAST . . .

- ***SAVES LABOR*** with push-button operation
- ***SAVES SPACE*** because machines are compact
- ***SAVES TIME*** by cleaning more loads per day
- ***SAVES POWER*** since no compressor is needed
- ***SAVES TOOLS*** because all scale is removed

"Dag" Colloidal Graphite Dispersions Improve Parting...Production...Profits

Use **"dag"** colloidal graphite dispersions to get superior reproduction of molds and patterns . . . minimize finishing of castings . . . decrease rejects and inspection time . . . increase mold life.

"Dag" colloidal graphite is a dry film lubricant unaffected by any temperature normally experienced in the foundry. It forms so thin a film on molds that you need never fear a change in dimensions of castings.

This specially processed graphite is easily applied by spray or brush to molds, chills, patterns, cores, push pins, shoulder screws, flask pins . . . even ladle interiors.

More data on the advantages of **"dag"** colloidal graphite as a parting compound are contained in a recent bulletin available on request. Write TODAY for Bulletin No. 425-14D.

dag DISPERSIONS®

Acheson Colloids Company, Port Huron, Mich.

. . . also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

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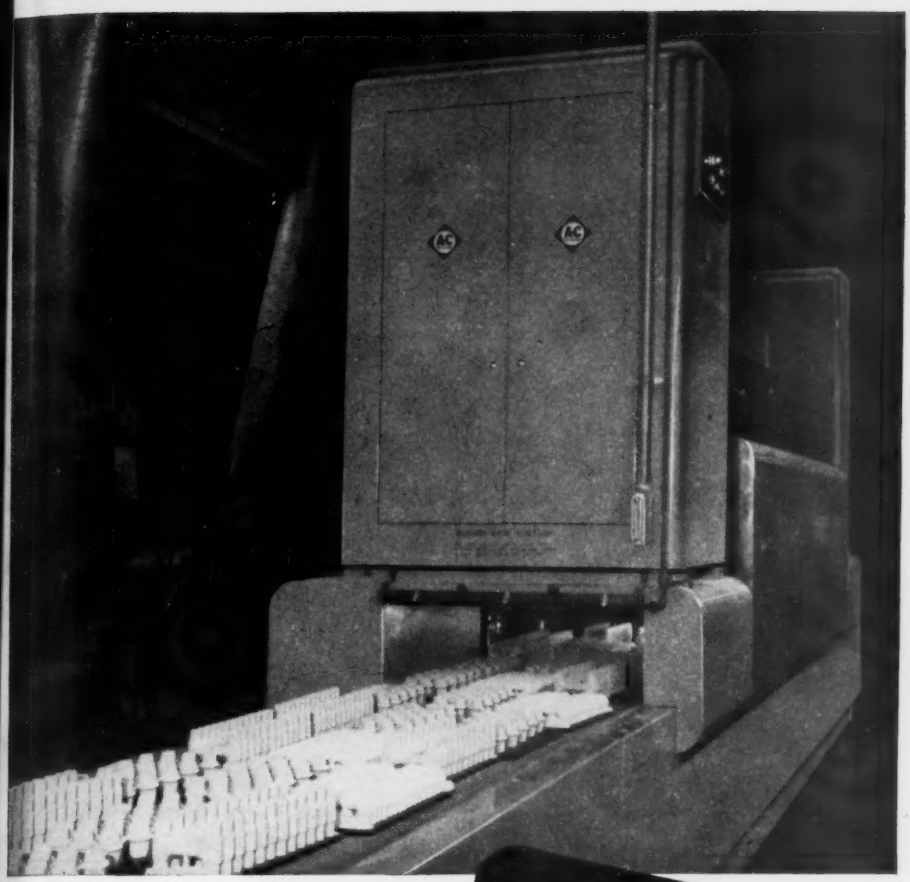


FOUNDROMATIC *Dielectric* SAND CORE DRYER

WHY PAY A Premium for Cores?

CUT CORE COSTS to the bone with reductions like these:

- **Reduce high handling costs 60-80%! Cores need only be moved twice: once to the dryer and then to the molder. No collecting, cooling, or storage handling required.**
- **Cut long drying cycles by 80%! Cores are dried in minutes instead of hours.**
- **Cut high fuel bills 60%! All the heat goes into the core. Best of all, short warm-up time permits turning off unit when not in use.**
- **Reduce your reject pile. Overbaking of cores and burning of fins and thin sections is eliminated.**
- **Put those big core storage spaces into production space. Make cores as you need them.**

The amazing thing is that these are not the only benefits. There are advantages in shakeout, improvements in core and casting quality, and improvements in working conditions.

We urge you to investigate this revolutionary development in core making.

Call your nearby Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3596

Foundromatic is an Allis-Chalmers trademark.

THE CORE BOX

Questions and Answers About Dielectric Sand Core Drying

1. Is any special or additional equipment needed when using a dielectric sand core dryer?

None, except plastic dryers to hold shaped cores. Marinite, transite, or plywood plates are recommended.

2. Can you use metal dryers or plates?

You can, but it will result in reduced production. The metal will act as a shield around the sand, requiring the core to be run a second time without the dryer or plate.

3. How many plastic dryers will be needed?

Far less than the normal amount of metal dryers. A maximum of 50 plastic dryers should suffice for each job unless more than one coremaker is working on the same job.

4. Can core rods or nails be used to help support cores?

Yes. For best results, rods or nails should be parallel to electrodes. If it is necessary to place rods or nails vertically in the core, they should be of minimum size in relation to core mass and should not protrude through surface of sand.

5. Will light sections burn if dried with heavy sections?

No. Cores will not burn in the *Foundromatic* core dryer.

6. What about moisture pick-up by stored cores?

Moisture pickup should be no more than with oil sand. Proper cure will produce a core that is practically impervious to moisture. Excessive amounts of cereal will contribute to moisture pickup. The big advantage is that production can be arranged to require a minimum storage of cores when *Foundromatic* dryers are used.

7. Can I add materials to increase hot strength?

Yes. Iron oxide, silica flour or Bentonite may be added to core mix, but will reduce the production as these materials naturally close the sand up, retarding the escape of moisture.

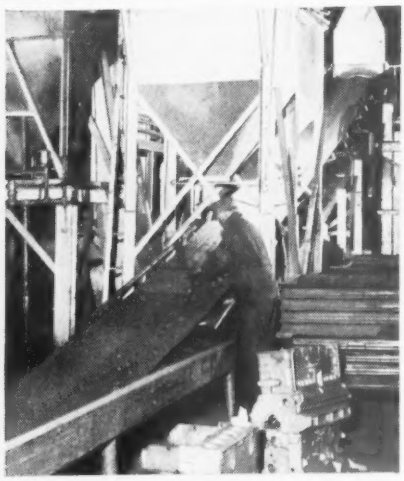
8. Is equipment safe from the standpoint of burns or shock?

Yes. Access doors are interlocked to shut off all power when opened.

ALLIS-CHALMERS

NASH TESTS COMPETITIVE BELTS

by piecing sections together



. . . and Imperial Rexall outwears all the others

Several years ago Nash Motors of Kenosha wanted to determine the best belt to use on the conveyor pictured here. So they pieced together several competitive brands and ran this combination belt in actual service for months. Standard Rexall showed such superior resistance to the tough wear of rough abrasive metal that it easily won this test and has since been used continuously on this conveyor. This belt is 30" x 6-ply, 615 feet long. It handles cores, rods, scrap, sand, shot and other refuse.

Job-Designed Belting

Standard Rexall is tightly woven from finest 37½-ounce silver duck. Plies are double-stitched with inner-locking stitches which positively prevent ply separation. The belt is saturated with special impregnating compounds to condition it for the service in which it will be used. Standard Rexall is ideal for conveying metal parts, castings, metal scrap, heavy boxes, crates and bags . . . and for conveying and elevating bulk materials such as clay, sand, coal, etc. It has a very low coefficient of sliding friction.

For new installations or replacements, there's an Imperial Belt that will cut your handling costs. Write for Data Sheet 51-9 and prices.

Imperial
BELTING CO.
1755 S. Kilbourn Ave., Chicago 23, Ill.

Engineered Belting
—The Right Belt for Each Job

With the EDITORS

PRE-CONVENTION Issue: While this issue is going to press, editors are busy preparing the great amount of material on the AFS International Congress and Show for the May, Pre-Convention issue. Because the three-ring circus of the foundry industry opens on May 1, the pre-convention issue will be mailed earlier than is usually the case, so that readers will have details on the affair in advance of the grand opening. Features of that issue will include a general story on the convention, information on the show and the list of exhibitors, the program of technical meetings and many other events of convention week, a list of committees handling the plant visitation and Sunday "free" day programs, ladies entertainment, and the program of awards. The special cover for the International Congress and Show issue has been approved, and will be off to the engraver by the middle of March. In addition to the convention information, the May issue will contain the usual number of feature articles and all of the regular departments. This really will be an issue which rates cover to cover study as soon as it arrives.

—o—

Scrap: Business papers have been assisting government and industry in publicizing the scrap drive. During the fall and winter the editor attended a number of meetings in Washington and New York to plan the publicity campaign. And don't let the present softness in cast scrap fool you. Foundries and steel mills will need plenty of scrap in the coming months, so continue your help to get out scrap, both ferrous and nonferrous.

—o—

Veterans: Once a year, the Penton Publishing Co., publisher of FOUNDRY, holds a luncheon to honor those employees who are reaching 30 years of service with the company during that year. Pat Dwyer, our engineering editor, was one of the guests of honor in 1949. The 1952 party was held in the ballroom of Hotel Cleveland on Mar. 10, with 322 employees present. The editor of FOUNDRY and four other employees were honored and given presentation watches suitably engraved. Others honored included Edward Freeman, Bindery; Albert V. Anderson, *Steel* Production; Gertrude Burkhardt, Auditing; and Clyde H. Bailey, *Steel* Service. It is interesting to note that 35 Penton employees have been with the company for 30 years or more, with four in the 40-year classification, 15 in the 35-year group and 16 in the 30-year group. Jack Ahrens, Eastern District manager and a 35-year veteran, Erle Ross, Chicago editor and a 30-year veteran, and E. C. Kreutzberg, Washington editor and a 40-year veteran, were in Cleveland for the party, but Ben Price, New York editor and a 35-year veteran was prevented from attending by the railroad strike.

—o—

Editorial Pages: Ever wonder how many editorial pages you receive in 12 issues of FOUNDRY? Last year the records show there were 1142-1/3 pages of editorial material, or an average of a little over 95 pages an issue. If all of this was devoted to type, it would represent around 100,000 words an issue. The record also shows that during the year a total of 3558 pages, including editorial, display advertising, classified advertising and where-to-buy, were printed.

—o—

Anniversary: Congratulations to the Lunkenheimer Co., Cincinnati, one of the fine, progressive foundries of the country, which this year is celebrating its 90th anniversary. What a lot of history has been made in these United States since Frederick Lunkenheimer had the courage to found a company for the production of valves back in the depths of the Civil War.

—o—

Spreading the Interest: One afternoon early in March, the editor attended a meeting of ASTM Committee A-3 on Gray Cast Iron, and listened to Jim Vanick and Herb Stewart review the activities of that group and its subcommittees. Needless to say, a tremendous amount of work is being done by a relatively few men in the development of specifications for the various types of gray iron. Of course, this represents

(Concluded on page 12)

Users say—

"More good castings per ton of metal"

with

HARBISON-WALKER

REFRACTORY

STRAINER CORES

Reports from users of Harbison-Walker Refractory Strainer Cores tell us:

"Tests with H-W Strainer Cores resulted in standardizing on type SC 075. We now get an even flow of metal into the mold; no wash from the cores."

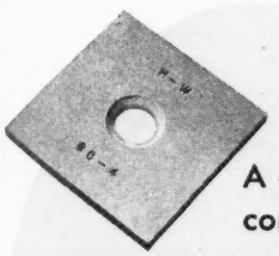
"The use of Harbison-Walker Strainer Cores has resulted in the most perfect bronze castings we have obtained in years. There have been practically no losses." (For a non-ferrous alloy subject to very close inspection.)

They reduce scrap loss to a minimum." (From a foundry using several thousand Strainer Cores per day.)

". . . with Harbison-Walker Strainer Cores we make cleaner castings. In fact, on one particular job we found it almost impossible to make a clean casting without type SC 063."

"The use of Harbison-Walker Strainer Cores for castings weighing 165 to 290 pounds has resulted in a reduction from 12% down to 3% in the amount of chipping, welding and grinding of defective surfaces due to sand and slag inclusions."

Under present conditions, the value of Harbison-Walker Refractory Strainer Cores becomes increasingly evident. Not only do you save money and labor, but the reduction of rejects increases production.



A cost-reducing companion . . .

Refractory Breaker Cores

Harbison-Walker Refractory Breaker Cores save time and money in the cleaning room by providing necked-down risers that are quickly and easily removed.

Made in ten sizes, packed in handy cartons, ready to use. These refractory cores are prefired and do not generate gas to cause trouble in the mold. For cleaner castings, faster production and saving of materials, use Harbison-Walker Refractory Breaker Cores.

HARBISON-WALKER REFRACTORIES CO.
Pittsburgh 22, Pennsylvania

Please send me complete information on:

☐ Refractory Strainer Cores
☐ Refractory Breaker Cores

Name_____ Position_____

Company_____

Address_____

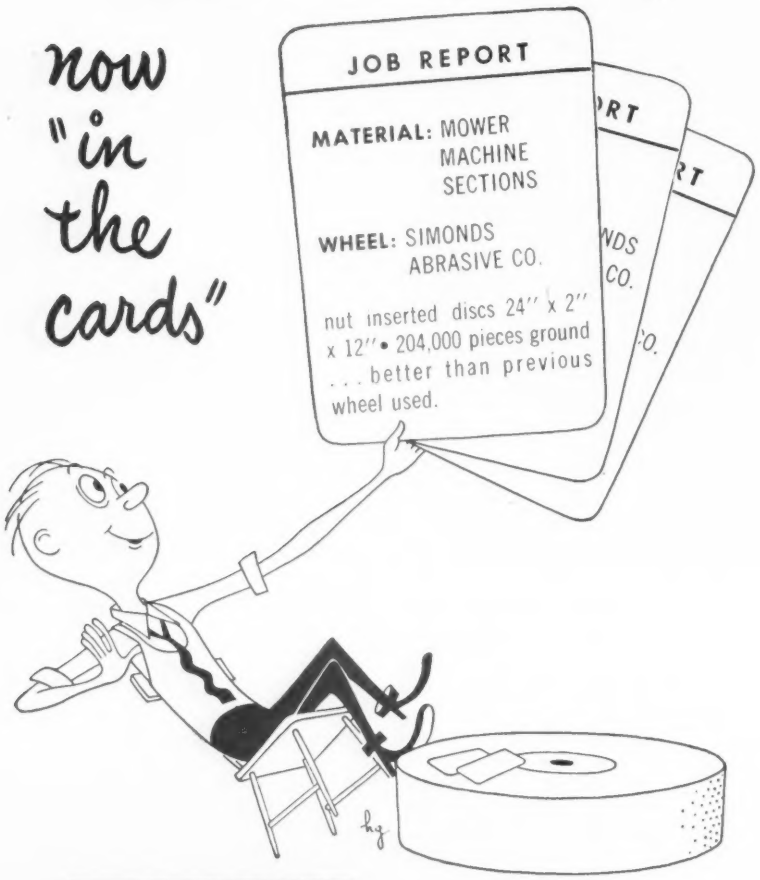
HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES

WORLD'S LARGEST PRODUCER OF REFRACTORIES

General Offices Pittsburgh 22, Pa.

Better disc grinding

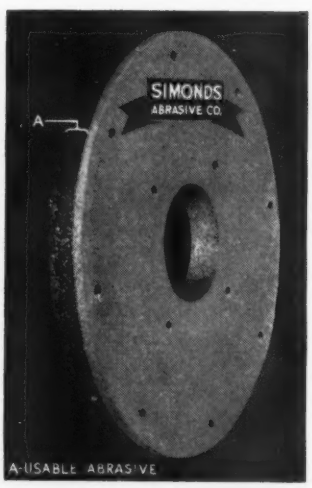
now "in the cards"


JOB REPORT
MATERIAL: MOWER MACHINE SECTIONS
WHEEL: SIMONDS ABRASIVE CO.
nut inserted discs 24" x 2" x 12" • 204,000 pieces ground . . . better than previous wheel used.

SIMONDS ABRASIVE CO.

Grinding Wheels

Take the gamble out of grinding wheel selection. Deal yourself in on top grinding performance with Simonds Abrasive Company Grinding Wheels. Complete line includes wheels of every combination of grain, grade and structure . . . wheels of all shapes and sizes . . . mounted wheels and points, segments and abrasive grains . . . industrially proved production tools backed by Simonds Abrasive Company complete quality control, expert engineering service, and 60 years experience as one of the nation's leading manufacturers of grinding wheels. Send now for free data book. Also the name of your Simonds Abrasive Company distributor.



SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

(*Concluded from page* 10)

only one phase of foundry interest in that society, since committees also are at work on malleable iron, steel, brass and bronze, and aluminum and magnesium castings. Attending these meetings always indicates that the foundry industry owes much to the men now serving on these foundry committees for the excellence of the job being done, but it also leaves the feeling that more foundries should provide technical talent for service on these committees.

—o—

Pen in Hand: If one were to judge by the letters reproduced recently in our "Readers' Comment" department, foreign foundrymen are more inclined to write to the editors than are our readers in the U. S. A. In the first three issues this year, communications have been published from Italy, Spain, India, Australia, Switzerland, Sweden and Japan. Needless to say, we like to hear from foundrymen everywhere.

—o—

Foundry on TV—To Albion Malleable Iron Co., Albion, Mich., goes the distinct honor of having its foundry operations included in the series of industrial programs sponsored by the National Association of Manufacturers and presented under the title of "Industry on Parade." The film for this program was taken by the National Broadcasting Co. and was released over 56 television stations in the United States. Shots of Albion operations included coremaking, molding, pouring, melting and annealing. Foundrymen should be grateful to AMICO and NAM for their co-operative effort in giving the viewing public a better understanding of how castings are made.

—o—

Foundrymen's Poet: Our thanks to the Electric Steel Foundry Co., Portland, Ore., for a handsome example of the printer's art received recently by Pat Dwyer and the editor. In the preface to the volume, the author, Bill Walkins, modestly announces this is a collection poems and ballads written in a foundry, by a foundryman for the edification—he should have added delight—of foundrymen. With a light, whimsical, humorous and, at times a sentimental and philosophical touch, he displays for the benefit of one and all the high and low points in the daily life of a foundryman. We also believe the genuine blown-in-the-bottle title, "Rammed Up And Poured," and the intimate, hilarious and true-to-life cartoons by Doug Goodrich deserve a bouquet or two. F.G.S.

DELTA FOUNDRY PRODUCTS SPEED PRODUCTION OF BETTER, CLEANER CASTINGS AT Lower Cost

CORE AND MOLD WASHES:

FOR STEEL:

Delta Special Core & Mold Wash Base — Used by more steel foundries than all other types of washes combined.

Delta SteelKoat — a finished high fusion waterproof wash.

FOR ALL TYPES OF SAND CAST METALS:

Delta ThermoKoat — It's plasti-lastic, non-heat shocking, highest fusion and hot strength.

Delta Z-Koat — a zirconium wash with unusual properties in contact with molten metal.

FOR GRAY IRON, MALLEABLE, BRONZE AND BRASS:

Delta GraKoat — no reaction with molten metal.

Delta BlacKoat — a black wash, free from carbon, no gas in contact with molten metal.

FOR GRAY IRON:

Delta BlacKoat S-5 — a new and different wash. Produces results, on gray iron castings, unequalled by any other wash.

FOR NON-FERROUS AND LIGHT METALS:

Delta NonferrusKoat — produces unusually smooth surface castings.

PARTING COMPOUNDS:

Delta Partex — (Nutshell partings) has lycopodium properties, non-injurious and non-hazardous to use.

Delta Liquid Parting — Low-cost, highly effective and lasting.

MUDDING & PATCHING COMPOUNDS:

Delta Sliktite — a light colored mud for all types of metal castings.

Delta Ebony — a black mud for gray iron, malleable and nonferrous work. All mudding compounds seal core joints and hold joints together at high temperatures.

NO-VEIN COMPOUND:

A special compound, not iron oxide. A high hot strength and sand plasticizing material. Stops veins and penetration.

MOLD SURFACE BINDERS—LIQUID:

Delta Spray Binders — Produce dry sand mold results by surface spraying of green sand molds.

PERMI-BOND:

Eliminates Sea Coal Nuisance: The new modern scientific sea coal replacement.

DRI-BOND:

A new type of Dry Binder which provides new economies. Fast-baking, reduces veining and penetration. Can be used with old sand equally as well as with new sand.

BONDITE: Produces a reducing mold atmosphere:

For Steel and Gray Iron — Use Delta Bondite, a dry binder which becomes waterproof on drying and produces mold atmosphere which is high in reducing gas.

96-B SAND RELEASE AGENT:

Another Foundry *"First"* by Delta. By adding 8 oz. or less per ton to your core or molding sand mixes, your sands will flow freely. 96-B is completely volatile at elevated temperatures and does not contaminate the sand.

CORE ROD DIP OIL NO. 224X:

Ties core rods and wires into the cores:

Rods and wires coated with Delta Core Rod Dip Oil adhere to the sand. Eliminates need for 50% of the rods and wires and reduces core breakage.

DELTA SAND CONDITIONING OIL:

Sticking core sand mixes work freely in core boxes when sand conditioning oil is added to core sand mixers.

CORE OILS:

High tensile, low gas, faster baking, exceptionally economical to use.

Get the Facts...

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

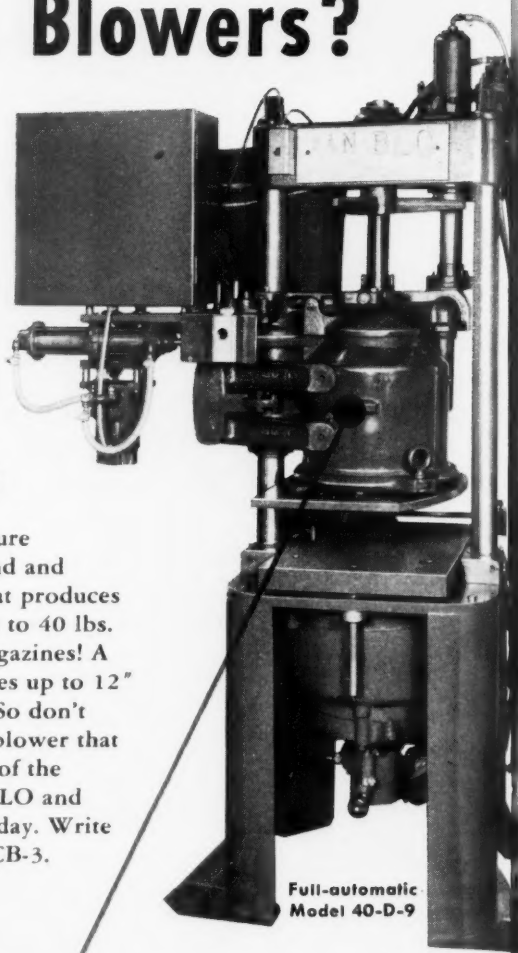
DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

Using "part time" Core Blowers?

Then investigate the SAN-BLO, the core blower that never stands idle!

Core blowers can't earn their keep if they're standing idle. If non-flowable core mixtures or frequent job changes make it impossible to use your present blowers as much as you'd like—better check the SAN-BLO. Here's a *new type* core blower that blows *any* mixture you can hand ram, including facing sand and resin-bonded mixtures! A blower that produces cores weighing from a few ounces to 40 lbs. each, *without* changing sand magazines! A blower that handles core boxes up to 12″ high, 18″ wide, 24″ long. So don't be satisfied with a core blower that stands idle even part of the time—get a SAN-BLO and keep it busy all day. Write for Catalog CB-3.



Full-automatic Model 40-D-9

Motor-driven plows, revolving in the SAN-BLO's sand magazine during the blowing cycle, move sand continuously to the blow hole and keep blow plate evenly covered with sand at all times. No "piping"!

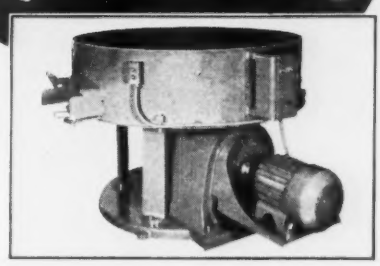
See the SAN-BLO and other Federal equipment at the Foundry Show, Booths 1429-1433.

An "aerating" air circuit introduces air through the lower inner wall of the SAN-BLO's sand magazine and, with the plows, make it possible for sand to be carried by the air stream into the core box.

You'll also get better results with these FEDERAL machines!

Fast, thorough mixing *without* crushing or overheating—that's the big advantage offered by the WHIRLMIX. The resilient, spring leaf arms whirl sand to the sides of the mixer, where it is squeezed and rubbed between the rubbing plates and mixer wall. This efficient action aerates as well as mixes, producing a perfect mixture with maximum bond, and frequently permits a reduction in the use of core oils and cereal binders. Four models (see chart). Write for full details.

NOTE: *Recent tests have shown that the WHIRLMIX is ideal for mixing synthetic resins for the new shell-molding process.*

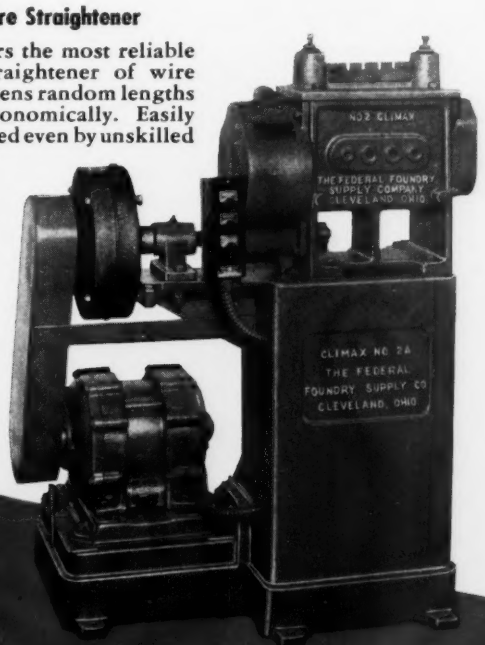


WHIRLMIX Sand Mixer

SAND MIXTURE	BATCH SIZE				MIX TIME
	Lab Model 0.5 h. p.	No. 100 2 h. p.	No. 300 5 h. p.	No. 600 7.5 h. p.	All Models
Core Oil Sand	15 lbs.	100 lbs.	300 lbs.	600 lbs.	3 minutes
Facing Sand	10 lbs.	60 lbs.	200 lbs.	400 lbs.	1½ minutes
Dry Core Comp	10 lbs.	60 lbs.	200 lbs.	400 lbs.	1½ minutes

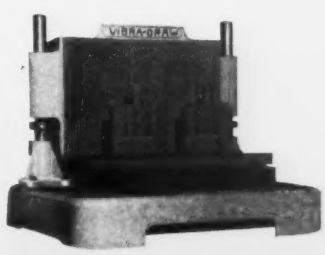
CLIMAX Wire Straightener

For over 40 years the most reliable and efficient straightener of wire and rod. Straightens random lengths quickly and economically. Easily and safely operated even by unskilled workers. Nine models offer choice of drives and wire sizes. Write for information.



VIBRA-DRAW Core Drawing Machine

An easily operated, yet highly efficient machine—for apprentice or experienced core makers. Core box is simply placed against vibrating head and lifted—a perfect core every draw. Bench or floor models. Complete details on request.



MILLET Core Blower

Bench model core blower for quick, economical production of small cores weighing up to 3 lbs. each. Easily operated by inexperienced help. Handles boxes up to 6½" high, 9½" x 12" blowing surface. Write for full details.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

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RICHMOND, VA.
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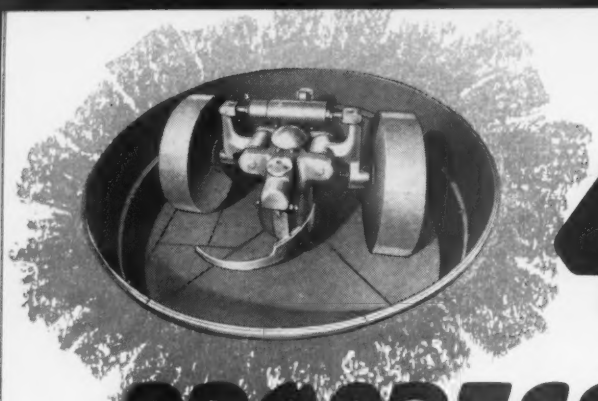
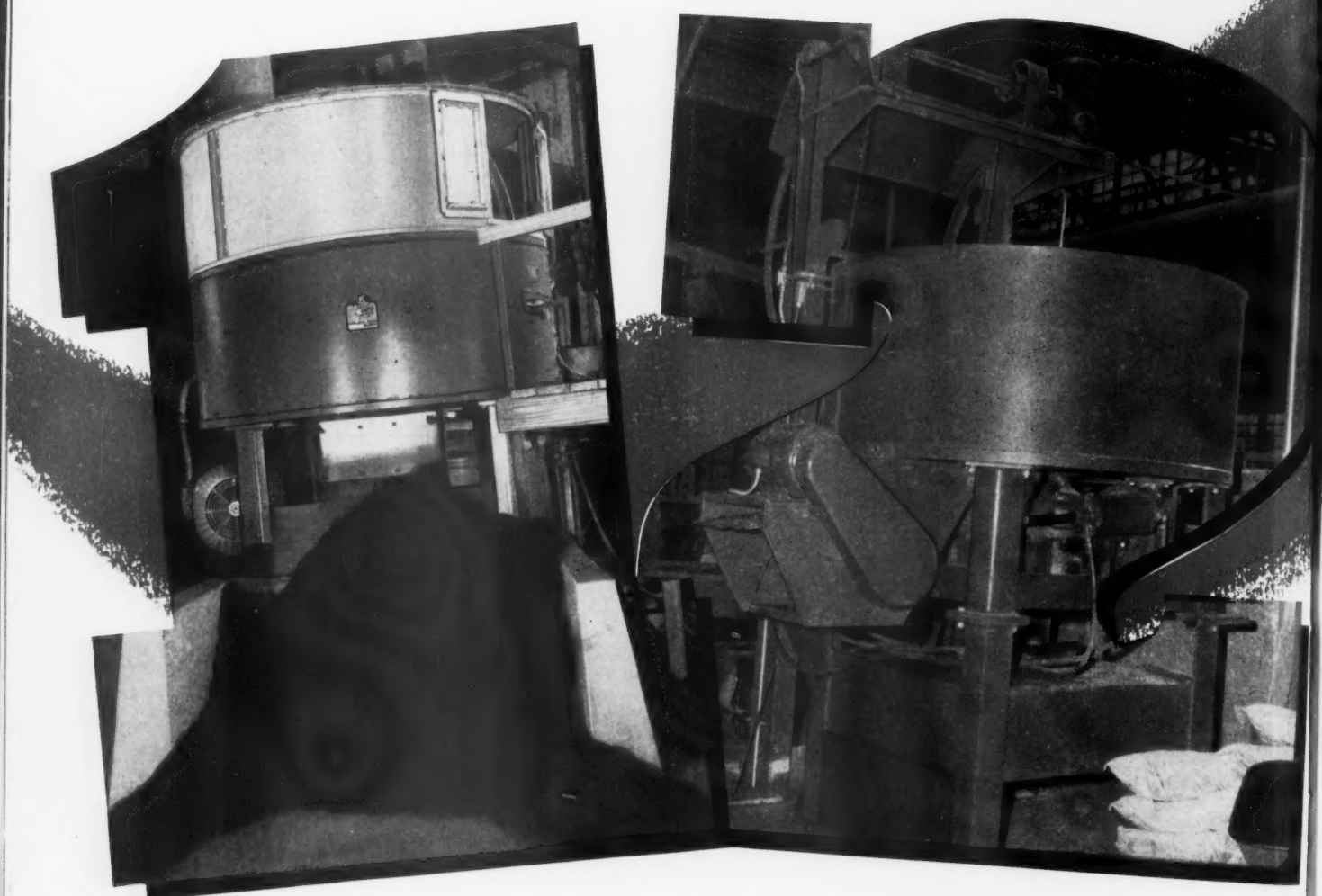


4 MORE PROGRESSIVE FOUNDRIES

increase production and improve casting quality by using NEW SIMPSON Intensive MIX-MULLERS



HOMER FOUNDRY CORPORATION, Coldwater, Michigan . . . This progressive gray iron producer is well known for high quality castings. Helping to maintain this quality, as well as to maintain an increased production schedule is the newly installed Simpson 3F Mix-Muller shown above. Like all the new 2F and 3F Mix-Mullers, this unit features adjustable Mullers for greater versatility.

GENERAL MACHINE COMPANY, Emmaus, Pa. . . . Another well-known gray iron producer that demands highest casting quality, installed a new 2F Mix-Muller, National Aerator and Bucket Loader with these results: Doubled previous sand output—Eliminated 20 man-hours per day—Only 4% scrap per month on 250 to 350 tons of finished castings, including machine shop scrap.

LARGE MIDWEST STEEL FOUNDRY . . . The illustration above shows another 2F Simpson Mix-Muller installation with integral National Bucket Loader that has paid off in greatly increasing existing production capacity, with a general improvement in casting quality.

DICK BROTHERS, Reading, Penna. . . . Shown here is the latest addition to this modern non-ferrous foundry —a new 2F Simpson Intensive Mix-Muller, which is being used to provide large batches of properly prepared sand for a quality line of plumbing fixture castings.

THE four installations shown here are typical of the long list of progressive foundries all over the country that are discovering the outstanding ability of Simpson 2F and 3F Intensive Mix-Mullers to handle at least ⅓ more capacity than previous models. Equally important is the ability of these modern, heavy duty mullers to produce the highest quality sand . . . which in turn assures highest quality castings, with less rejects, lower scrap loss.

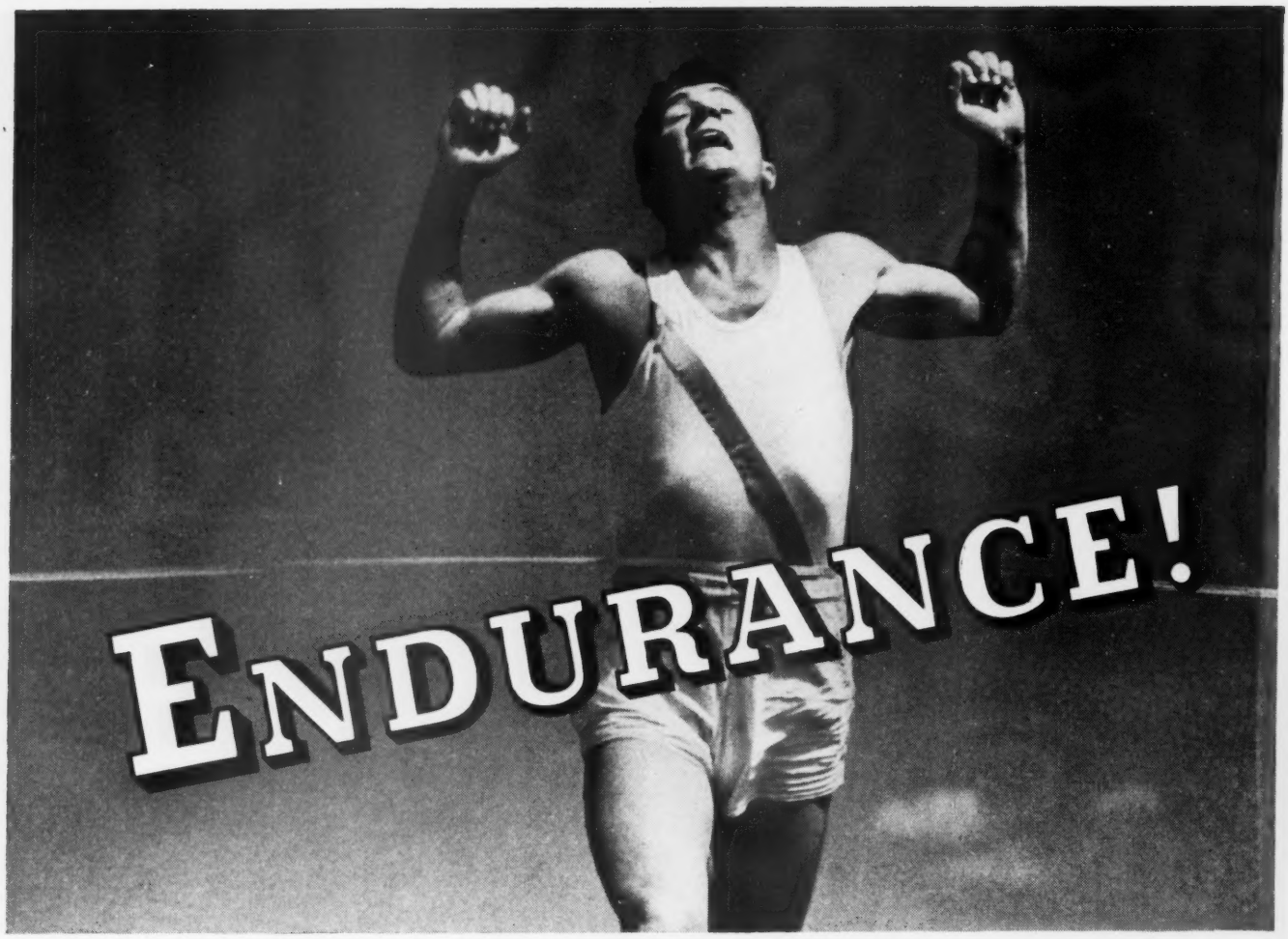
Why not let our engineers prove what these high production Mix-Mullers can do for you? In the meantime, send for a copy of our descriptive Bulletin 511.

SIMPSON
Intensive
MIX-MULLERS

National Engineering Company

608 Machinery Hall Bldg. • Chicago 6, Illinois

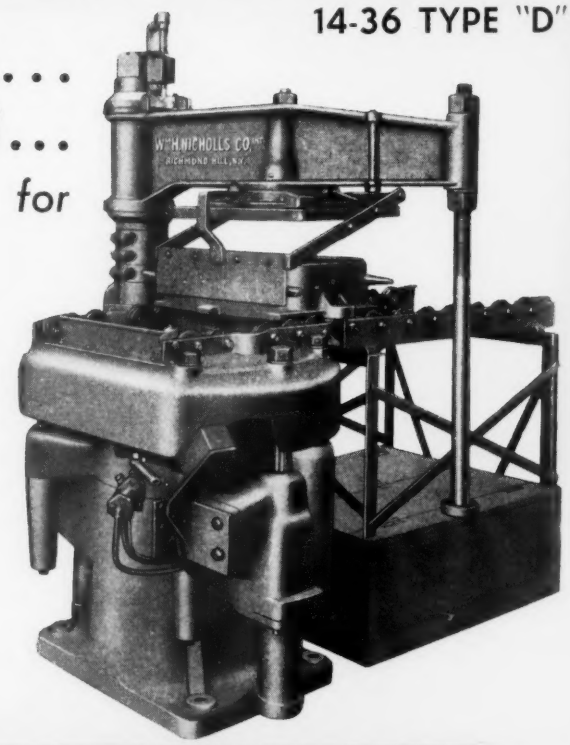
Manufacturers and Selling Agents: For Continental European Countries — George Fisher, Ltd., Schaffhausen, Switzerland; for British Possessions — August's Limited, Halifax, England; for Canada — Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney; for Argentina, Brazil and Uruguay — Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico — CASCO .S. De R.L., Mexico, D.F.



14-36 TYPE "D"

HEAVY DUTY MOLDING MACHINE . . .
JOLT SQUEEZE AND PATTERN DRAW . . .

Equipped with Single Push Button for Fully Automatic Operation.



Heavy Duty Combination Jolt & Power Squeezer Molding Machine with pneumatic pattern draw and power operated self positioning parallel squeeze head. Equipped with electrical controls for single button automatic operation of Jolt, Squeeze, Pattern Draw and Cross-arm. Including Automatic Sand Strike-off, Mold Pusher & Adjustable Flask Rolloff Device.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL 18, LONG ISLAND, NEW YORK

ESTABLISHED 1910

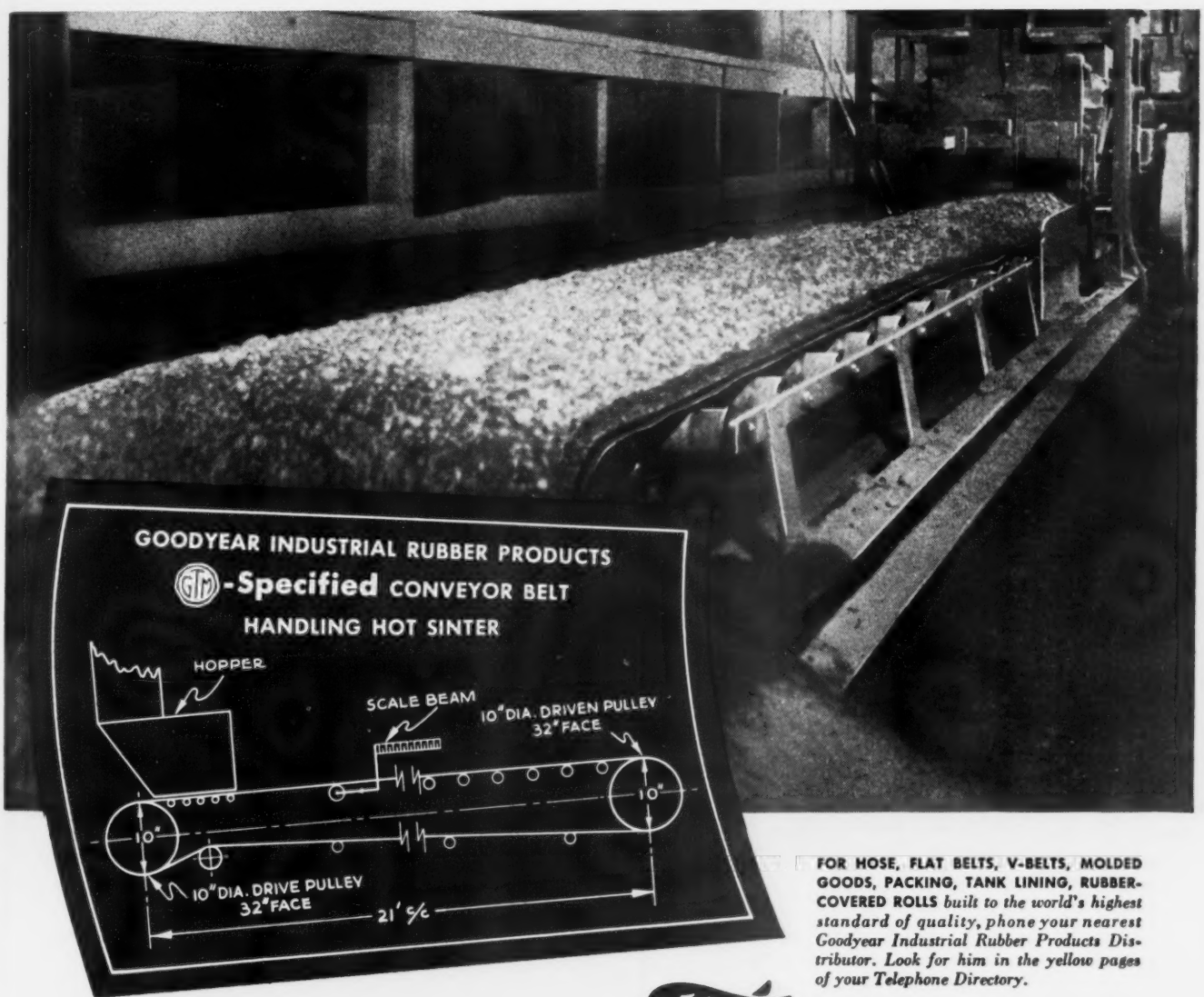
NICHOLLS

Triple Service

Goodyear Conveyor Cuts Belt Cost $413—while handling almost three times the tonnage of the previous belt

Ordinary 5-ply conveyors handling hot sinter at 200°-300° F. failed in three months or less because of heat, caustic attack on the belt and small drive pulleys. The best record was 23,545 tons before failure on the top cover.

Then the G.T.M.—Goodyear Technical Man—recommended a 3-ply Goodyear Style 6740 "Hot" Belt. It outlasted any other belt ever tried—served almost 9 months—handled 68,750 tons of material. This thinner belt gave closer control on the weighing device measuring out sinter as well—saved an estimated $413.44 ($6.08 per M tons) on belt costs alone!



FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor. Look for him in the yellow pages of your Telephone Directory.*

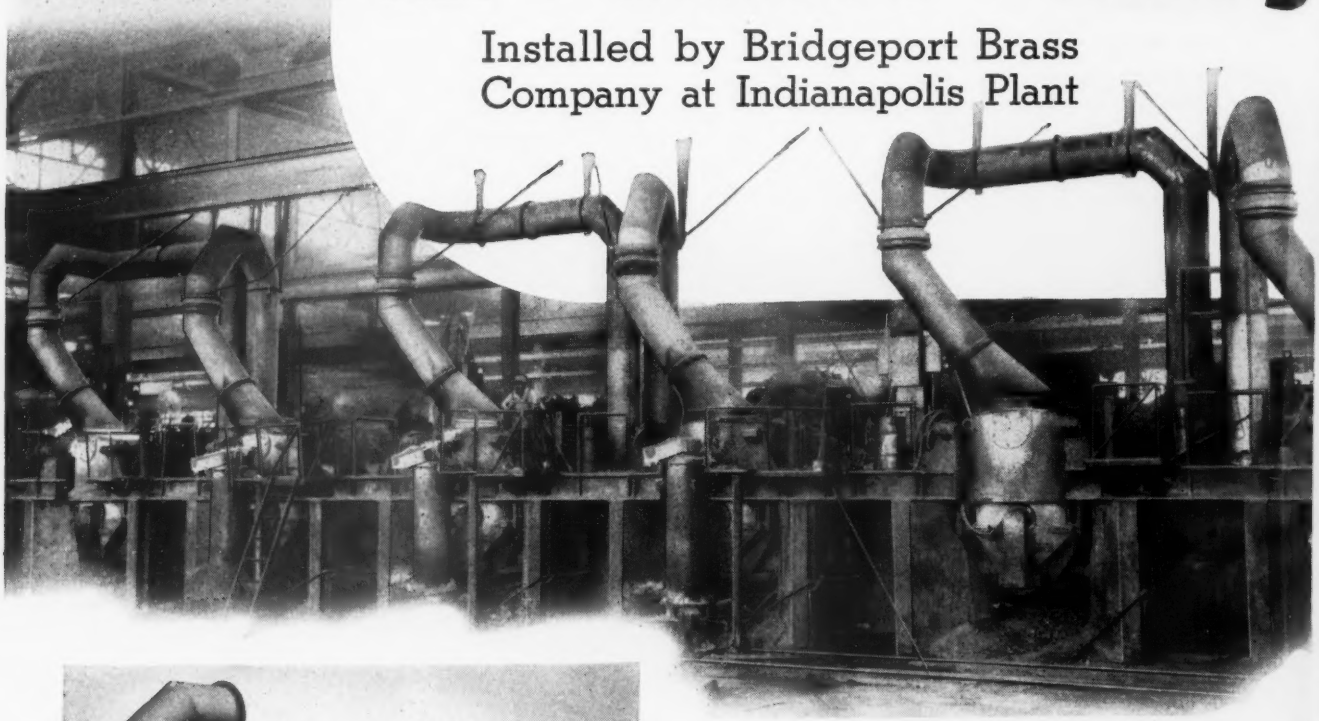
GOODYEAR

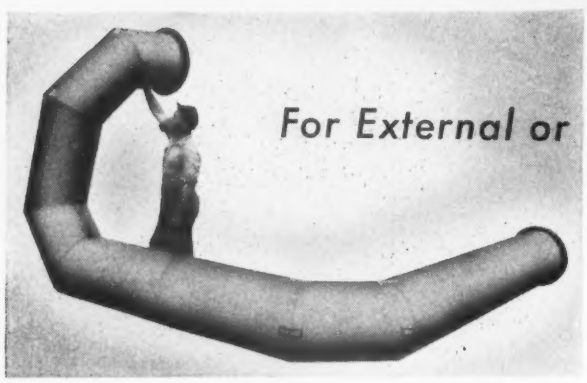
THE GREATEST NAME IN RUBBER

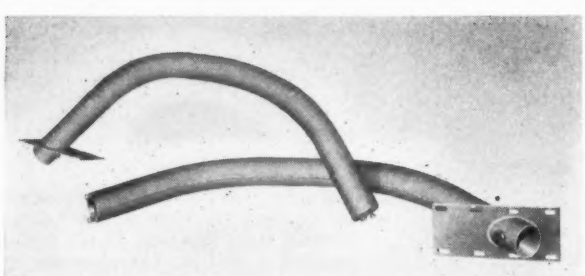
We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

PSC
Thin-Wall Furnace Tubing

Installed by Bridgeport Brass Company at Indianapolis Plant







We precision assemble the most complicated designs of radiant furnace tubes. Send blue prints or write as to your needs.

For External or Internal Furnace Applications, in Most *Complicated* Designs

These vent stacks loom up large in the casting shop of this "Bridgeport Brass" plant. But how to exhaust the fumes above the six Ajax electric furnaces during pouring of molten brass had loomed up equally large, as a problem. Pressed Steel Company's wealth of experience in fabricating complicated alloy tubing assemblies in any diameter up to 60" helped solve it. Each assembly, made of No. 10 gauge Type 430 alloy, is 73 feet long and ranges in diameter from 19" to 33". Featuring thin-wall return bends, PSC welded alloy tubing assemblies offer a lightweight method of construction that is introducing large savings in many types of installations requiring corrosion and heat resistance. See how The Pressed Steel Company can help you.

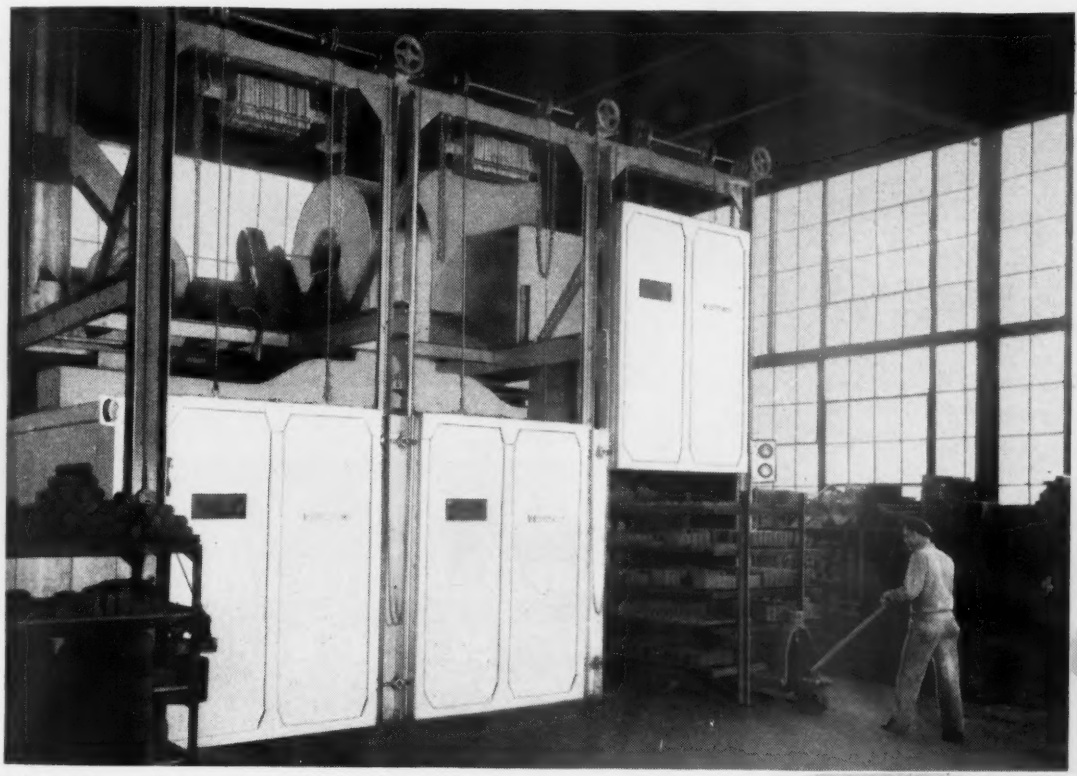
THE PRESSED STEEL COMPANY
of WILKES-BARRE, PENNSYLVANIA

Industrial Equipment of Heat and Corrosion Resistant WEIGHT-SAVING *Sheet Alloys*

☆ ☆ ☆ OFFICES IN PRINCIPAL CITIES ☆ ☆ ☆

more production...less waste!

COLEMAN OVENS



Coleman Transrack Ovens at Crucible Steel Castings Co.

● Coleman Transrack Core Ovens enable you to produce more uniformly baked cores and obtain increased production of more, better quality castings. Perfect baking eliminates core and casting scrappage . . . saves valuable materials, time and manpower.

Coleman Transrack Core Ovens, for use with hand or power lift trucks, are particularly efficient where ample floor space is available. Dependable baking results in uniformly better cores . . . increases core production and lowers costs.

Coleman Ovens are built in all conventional types and sizes as well as specially engineered installations to meet every operating requirement. There is a type of Coleman Oven to help give you maximum production on every core baking or mold drying job. Write today for Bulletin 48.

Only COLEMAN OVENS offer all these advantages:

- PERFECT DRYING AND BAKING eliminate manpower and casting losses due to make-overs and rejects.
- INCREASED PRODUCTION by making the most efficient use of skilled and unskilled labor.
- HEAVY DUTY-CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost.
- GREATEST SAVINGS IN FUEL by using the most economical fuel available.
- MOST ECONOMICAL CORE BINDERS for your particular casting requirements, oil or resin, can be used.

A COMPLETE RANGE OF TYPES: COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.

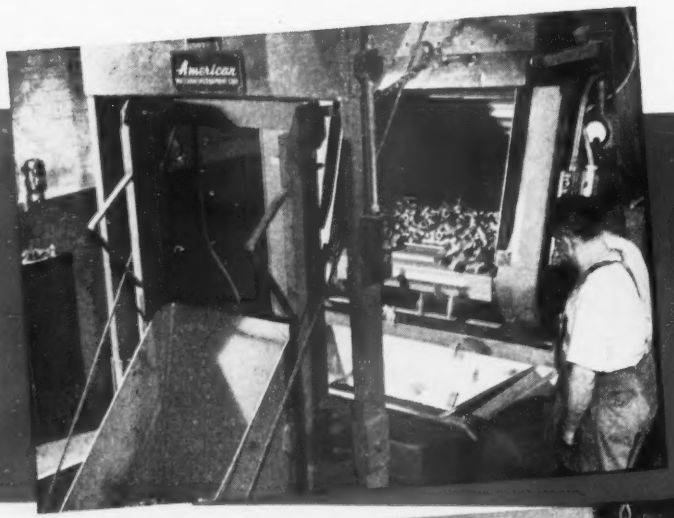
THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD — CLEVELAND 13, OHIO

MEMBER FEMA

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

Wheelabrator® saves



SMALL

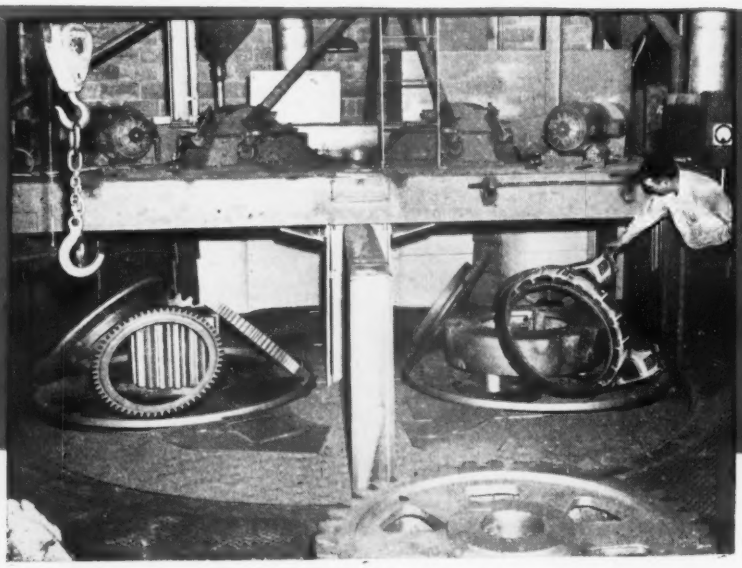
WHEELABRATOR SAVES
$1108 a year for the Welsbach Corp.

Savings resulting from the installation of a Wheelabrator Tumblast at the Kitson Division of the Welsbach Corporation have more than repaid the investment. The Wheelabrator now cleans castings in three to four minutes that formerly required 45 minutes by the old method.

MEDIUM

WHEELABRATOR SAVES
$4777.50 a year for Auto Stove Works

One Wheelabrator replaced 8 tumbling mills at the Auto Stove Works, New Athens, Illinois and reduced cleaning costs $95.55 per week. It cleans castings so thoroughly that tools now last longer and the overall efficiency of the foundry has been improved.



LARGE

WHEELABRATOR SAVES
$10,275 a year for Sawbrook Steel Castings Co.

The Wheelabrator Twin Table, installed at Sawbrook Steel Castings Co., is effecting a direct traceable savings of $41.10 every working day. This machine cleans castings weighing from 50 lbs. to 3500 lbs. each. It has reduced operating and maintenance costs to a minimum.

Visit our exhibit booth 1817-1820
INTERNATIONAL FOUNDRY CONGRESS
Atlantic City, May 1 to 7

HOW TO SAVE ABRASIVE COSTS

Bulletin 59-A shows how abrasive costs are lowered using Tru-Steel Shot. Write for your copy today.

smoney for any size foundry

	FORMER METHOD	WHEELABRATOR METHOD	
MACHINE	Two wet tumblers	27″ x 36″ Wheelabrator Tumblast (5 cu. ft. capacity)	
PRODUCTION	1.74 tons daily	1.92 tons daily	**SAVINGS** $2.31 per ton $1108.00 per year
COST per ton	$6.75	$4.45	
MACHINE	8 tumbling mills	36″ x 42″ Wheelabrator Tumblast (11½ cu.ft. capacity)	
PRODUCTION	12 tons in 9 hours	13 tons in 7 hours	**SAVINGS** $1.47 per ton $4777.50 per year
LABOR REQUIREMENTS	3 men @ 9 hours (27 man hours)	1 man @ 8 hours (8 man hours)	
MACHINE	Airblast Room and Humane Airblast Table	72″ Wheelabrator Twin Table with three Wheelabrator Units	
PRODUCTION	30 tons daily	30 tons daily	**SAVINGS** $1.37 per ton $10,275.00 per year
LABOR REQUIREMENTS	6 men, 50 man hours daily	3 men, 24 man hours daily	
COST per ton	$4.75	$3.38	

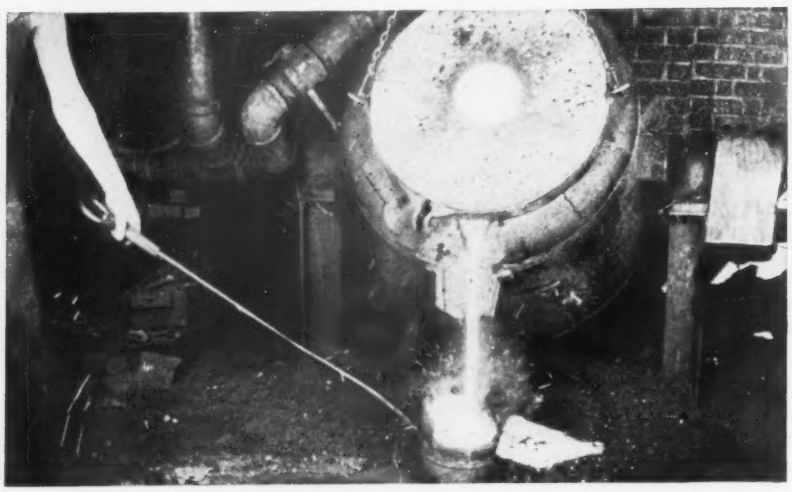
This new, informative book gives complete, concise information on all phases of Wheelabrator airless blast cleaning. Write today for Catalog No. 74-A.

American

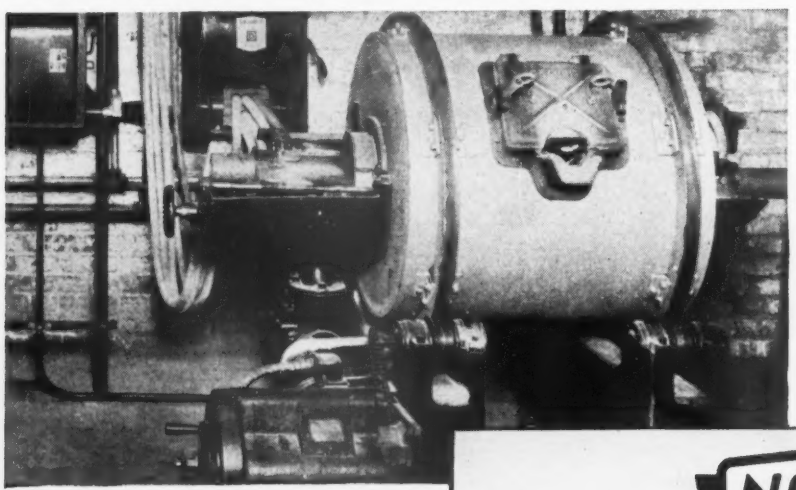
WHEELABRATOR & EQUIPMENT CORP.

505 S. Byrkit Street Mishawaka 2, Indiana

THIS REVERBERATORY FURNACE is lined with a Norton CRYSTOLON* refractory cement, engineered to last longer on this particular metal-melting job.



THIS TILTING CRUCIBLE FURNACE has a cover and lining made of a Norton CRYSTOLON refractory cement. It was engineered to fit this firm's individual requirements.



THIS INDIRECT ARC FURNACE owes much of its high output to its lining, made of a custom-engineered Norton ALUNDUM* refractory cement.

Melt more metal per furnace-hour

with refractory linings engineered for you

Every time you interrupt your metal-melting campaigns to patch or replace your furnace linings, you lose production you never get back.

That's why just *any* refractory cement won't do. You want the *one* cement that fits your requirements so exactly that it reduces interruptions to a minimum. Chances are, the one just-right cement hasn't been made yet.

That's where your nearby Norton refractories engineer enters your picture. He's ready to call on Norton Research . . . pioneers for 40 years in the development of special refractories for complicated high-temperature requirements.

Working together, you and Norton Company are sure to arrive at the one CRYSTOLON, ALUNDUM, MAGNORITE* or FUSED STABILIZED ZIRCONIA refractory cement that fits your exact requirements.

For more information about this special Norton service, call your nearby Norton refractories engineer, or write Norton Company, 301 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

*Trade-Marks Reg. U. S. Patent Office and Foreign Countries

NORTON

Special REFRACTORIES

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

YOU CAN CUT DOWN DISCARDS WITH MOGUL

LARGEST SELLER IN THE FIELD!

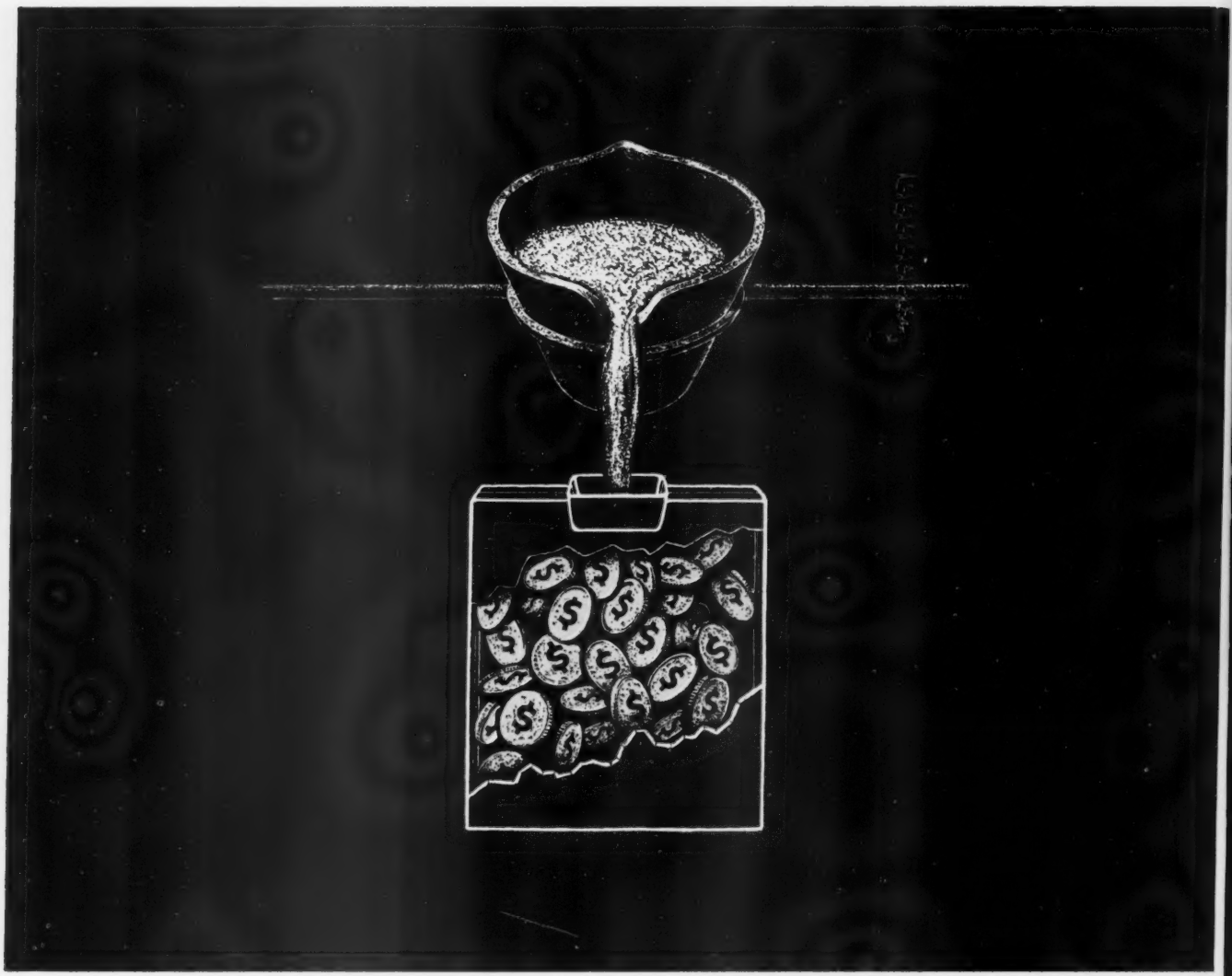
Kordek, the preferred dry bond for cores . . .

• CUTS DRYING TIME • MAKES SMOOTHER CORES

Full technical service, without obligation, is available to show how you can profit from the use of MOGUL® Cereal Binder in your production.

Write Technical Sales Department

CORN PRODUCTS REFINING COMPANY • 17 BATTERY PLACE, N. Y. 4, N. Y.



THE MOLD WITH THE MIDAS TOUCH

You'll find extra production dividends in the shell molding process. It yields castings that are virtually pattern-smooth, with tolerances as close as .003 to .005 of an inch per inch. Such castings need only a minimum of finishing, and there are fewer rejects, so that more good castings result from each ton of metal poured.

Using thin-shell molds and cores made of fine-grained sands bonded with BAKELITE Phenolic Resins, the process can be employed for ferrous and nonferrous castings alike. The highly porous molds permit gases to escape easily. Built-in guide pins and holes assure accurate registration, so that allowance for mold shift is unnecessary. Metal surfaces have no burnt-in sand.

Molds and cores can be made in advance and stored for long periods to meet production schedules. They are strong, moisture-resistant, uniform in quality. Light in weight, they are easily handled.

These savings in time, effort, space, sand and metal are well worth considering. To learn more about BAKELITE Phenolic Resins developed for the shell molding process, mail the coupon today.

Be sure to visit BAKELITE'S EXHIBIT at the INTERNATIONAL FOUNDRY CONGRESS AND SHOW Atlantic City May 1-7, 1952 Spaces 1229, 1231, 1233

Dept. DP-29, BAKELITE COMPANY,
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

Please mail my free copy of Booklet K-8, "BAKELITE Phenolic Resins for the Shell Molding Process."

*Name*_____ *Title*_____

*Company*_____

*Street*_____

*City*_____ *State*_____

BAKELITE
TRADE-MARK
PHENOLIC BONDING RESINS

TRADE MARK

BAKELITE COMPANY
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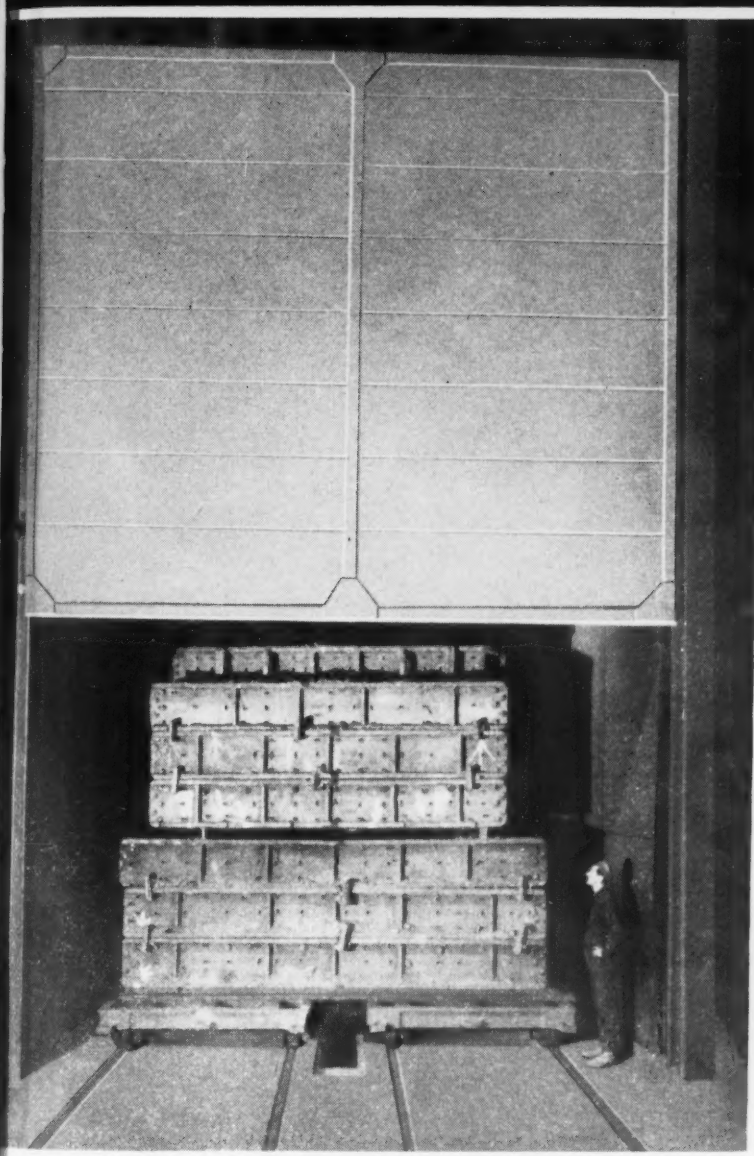
CARL-MAYER MOLD OVENS

Unusual in Size, too!



CARL-MAYER MOLD OVEN *at Blaw-Knox Div. of Union Steel Castings Co.*

DOOR CLEARANCE:
17'-9" wide, 15' high.
DEPTH: 40'

CAPACITY: 200 TONS PER BAKE.

Combination Gas-Oil Fired.

Carl-Mayer engineering advantages score again. This huge oven was chosen against several competitive makes—and its performance has won high praise from the owner.

If you are interested in ovens of this type, it will pay you to consider Carl-Mayer engineering and rugged construction.

CORE AND MOLD OVENS, all sizes. Also other types of Industrial Ovens and Furnaces.

Write for Bulletin 141 and 350

CARL-MAYER CORE AND MOLD OVENS ARE SERVING CONCERNS LIKE THESE:

Aluminum Co. of America
American Brake Shoe Co.
American Radiator Co.
Blaw-Knox Co.
Brown Industries
Buick Motor Div. of General Motors Corp.
Bucyrus-Erie Co.
Cadillac Motor Div. of General Motors Corp.
Columbia Steel Corp. (U. S. Steel Corp.)
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Eclipse Aviation Division of Bendix Aviation Corp.
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Whiten Machine Works
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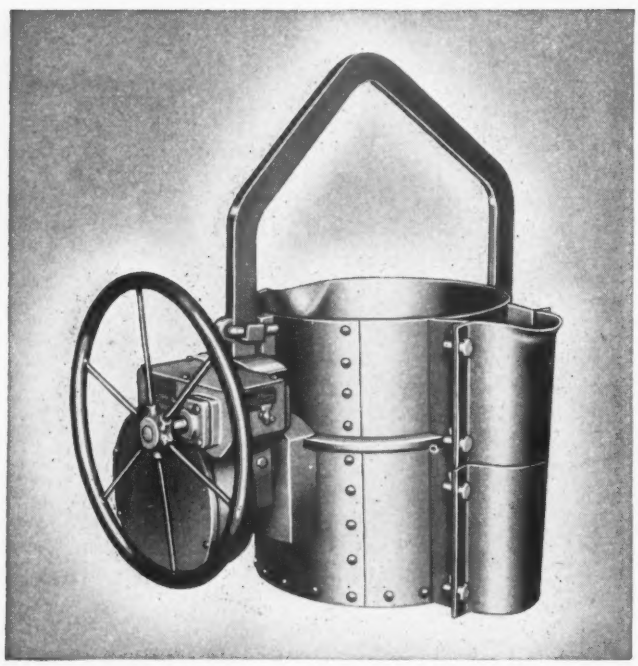
THE CARL-MAYER CORPORATION

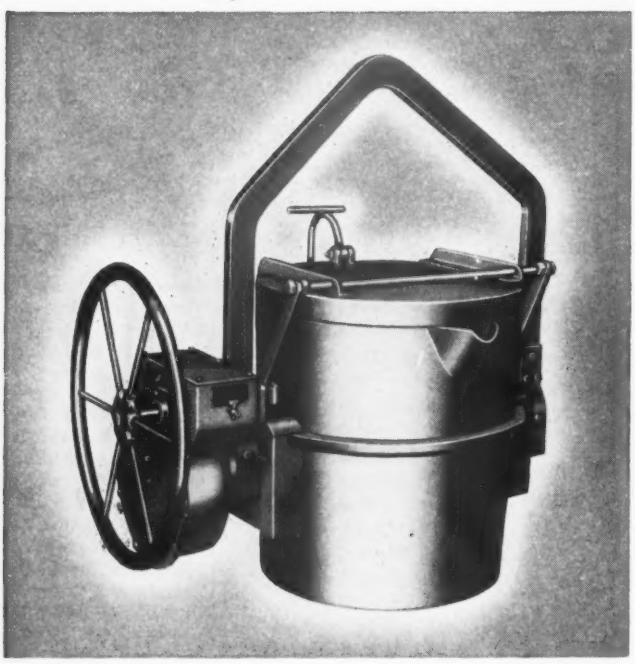
3030 Euclid Avenue • Cleveland, Ohio

BACKED BY REPUTATION AND OVER 30 YEARS' EXPERIENCE

YOU'LL FIND THE TYPE LADLE YOU WANT AT

Ladle Headquarters





Industrial Equipment has all the ladles: teapot spout . . . covered . . . cylindrical . . . reservoir . . . buggy . . . bottom discharge . . . and many others, standard and special.

Each represents the last word in proven design and operating efficiency. All Industrial Crane Ladles are available with Industrial's revolutionary new universal bail which completely eliminates binding from heat or misalignment.

All geared ladles use Industrial's new hi-safety, self-locking worm gearing which uses no gaskets and which can be easily adjusted by anyone.

Write for Industrial's latest catalog. Illustrations, sizes, dimensions, technical features: all are included.

LADLES

SHANKS

BOWLS

TONGS

Industrial
EQUIPMENT COMPANY

115 NORTH OHIO ST., MINSTER, OHIO

Here's More Proof of B&W Allmul Firebrick Performance

BILLET HEATING FURNACE

"ALLMUL more than doubles life of lining"

A large manufacturer was faced with high refractory maintenance in the discharge zone of a side-discharge billet heating furnace. Combustion chamber temperatures were 2600F-2700F. Production was high—a billet was discharged every 30 seconds. Thermal shock and high temperatures caused various semi-mullite refractories to fail in 5 to 6 months. Then this area was relined with B&W Allmul Firebrick. Result: Allmul stood up for 13 months—2 to 2½ times as long!

ELECTRIC FURNACE ROOF

"ALLMUL lasts 3 to 6 times as long"

In a six-ton electric furnace, handling 15 tons of stainless steel per charge, super duty firebrick had to be replaced every 20-40 heats. Pouring temperature of the metal was in excess of 3100F, with higher temperatures attained in the furnace during periods of oxygen introduction. The owner installed B&W Allmul Firebrick, hoping for a life of 80 heats. Allmul in the first roof lasted for 122 heats—42 more than hoped for. The second roof of Allmul went to 131 heats! Result? Orders to date for three carloads of Allmul.

INDIRECT ARC FURNACE

"All furnaces converted to ALLMUL after comparative tests"

A large company making alloy steel castings has several indirect arc furnaces melting various alloys, with pouring temperatures varying from 2700F to 3100F. With highest temperature alloys, semi-mullite brick burned out in 6-10 heats. B&W Allmul, which cost approximately the same, showed no appreciable wear after 20 heats. On alloy steels in general, this customer reports far less slag formation (an indication of reduced refractory wear) with Allmul than with any other refractory used. Result: All furnaces are being relined with B&W Allmul Firebrick.

FORGE FURNACE HEARTH

"ALLMUL lengthens life, keeps dry hearth"

A drop forge company was faced with this problem on its 72" wide slot-type furnace operating at 2350F-2400F: Low cost refractories gave soupy slag on the hearth, affecting product quality and die life. More expensive refractories, including chrome plastic and chrome firebrick, eliminated liquid slag, but their life was so short that their use could not be justified economically. A completely new hearth was installed consisting of 4½" of Allmul on top of 2½" of B&W Junior and 5" of B&W IFB. Result: Completely dry bottom; easy removal of scale; *and Almull was in good condition after 5 months of operation.* Based on this performance, additional Allmul hearths were ordered.

Yes, the facts about B&W Allmul Firebrick speak for themselves. This fused mullite brick is proving its economy in dozens of severe service applications. The reason? A unique combination of refractory properties—high hot load strength, high resistance to spalling, good volume stability, a high melting point of 3335F—all resulting in lower furnace costs. Want more data? Write for Bulletin R-29.

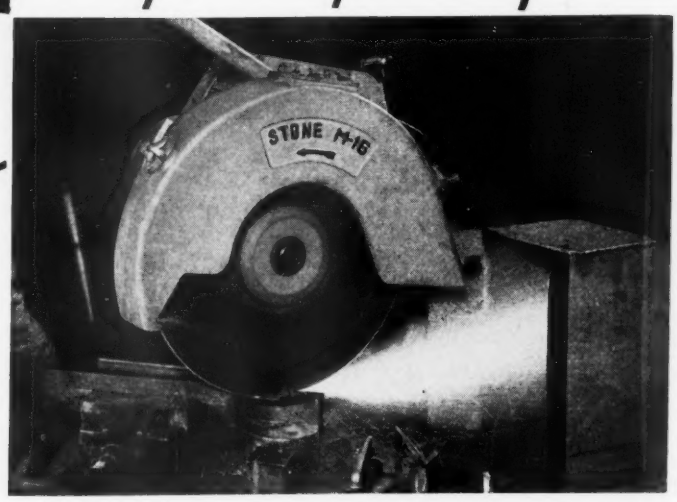
BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.

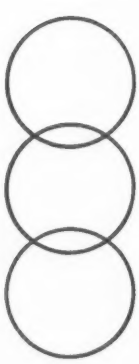
R-435

B&W REFRACTORIES PRODUCTS—B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick B&W Refractory Castables, Plastics and Mortars • OTHER B&W PRODUCTS—Stationary & Marine Boilers and Component Equipment... Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

THREE CUTS IN ONE



MANHATTAN CUT-OFF WHEELS



CUT down COSTS, because the number of cuts per wheel have been increased through the development of tougher rubber and resinoid bonds. Replacement wheels are not required as frequently.

CUT non-productive HOURS, since there is less down-time for wheel changes. Manhattan Cut-Off Wheels designed for specific work and specific materials give better cuts.

CUT out PROBLEMS. Manhattan supplies you with the right cut-off wheel for ferrous or non-ferrous castings, steel bars, pipe, structural shapes, stone or reinforced concrete, light gauge tubing, hardened or soft steel, heat-sensitive alloys, ceramics, or glass.

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION

RAYBESTOS-MANHATTAN, INC. **PASSAIC, N. J.**

Flat Belts

V-Belts

Conveyor Belts

Hose

Roll Covering

Tank Lining

Abrasive Wheels

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls

how to reduce RAM-OFFS

LINK-BELT Sand Revivifiers and Sep-Aerators assure flowability . . . cut sand preparation costs by thorough aeration

Here's a simple, economical way to cut down scrap. Link-Belt Sand Revivifier gives you an aerated, fluffy sand with corresponding drop in temperature, that flows easily around every corner of the pattern . . . rams to a uniform density every time.

In non-ferrous foundries, the Link-Belt Sep-Aerator removes metallic shot by centrifugal action. Both are well engineered, standardized units built for many years of service.

For full information, call the Link-Belt office near you. A foundry specialist will be glad to work with you or your consultants to help you increase production in your foundry.

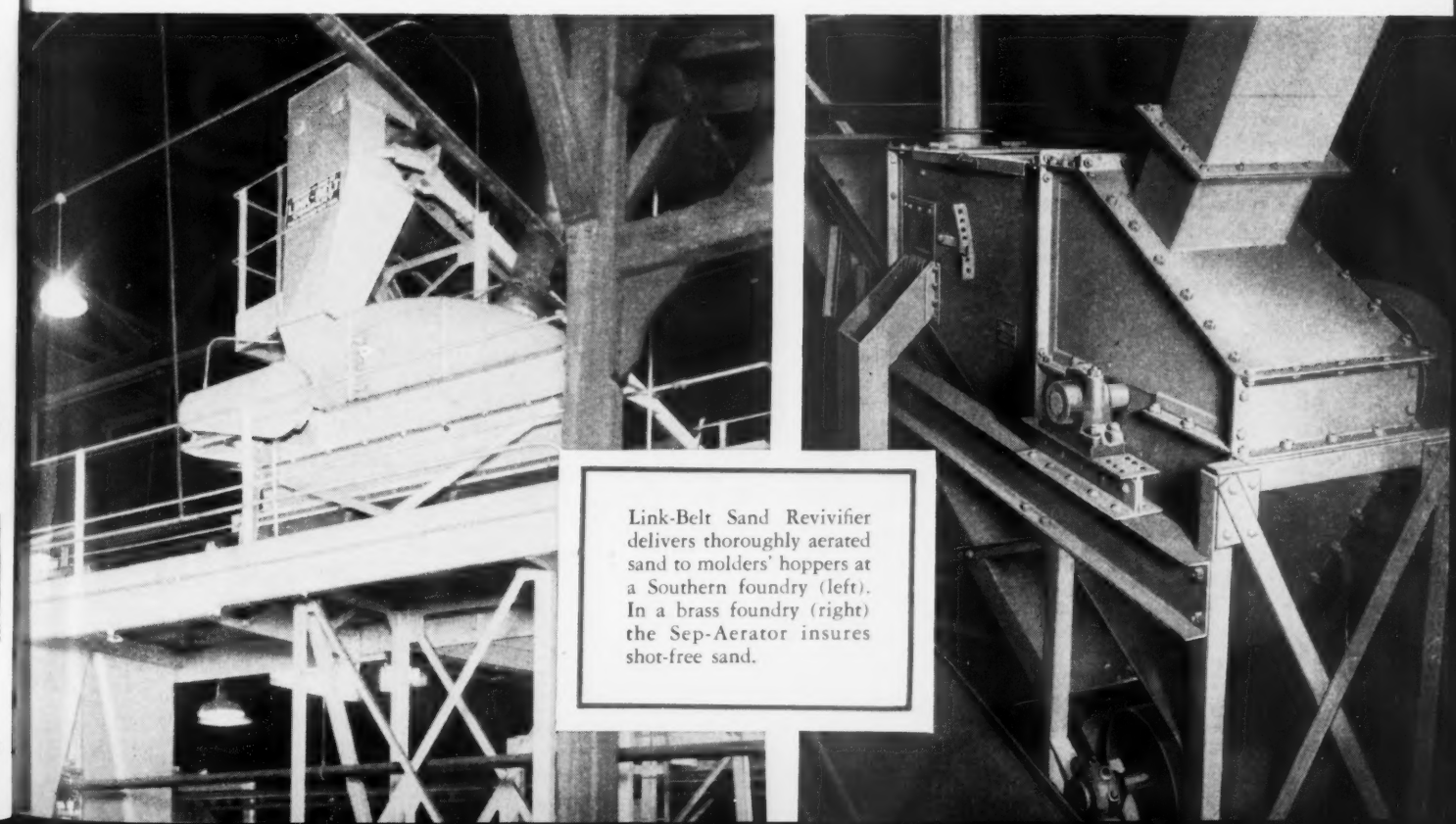
FEMA MEMBER FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in Principal cities.

LINK-BELT

12,467

CONVEYORS and PREPARATION MACHINERY



Link-Belt Sand Revivifier delivers thoroughly aerated sand to molders' hoppers at a Southern foundry (left). In a brass foundry (right) the Sep-Aerator insures shot-free sand.

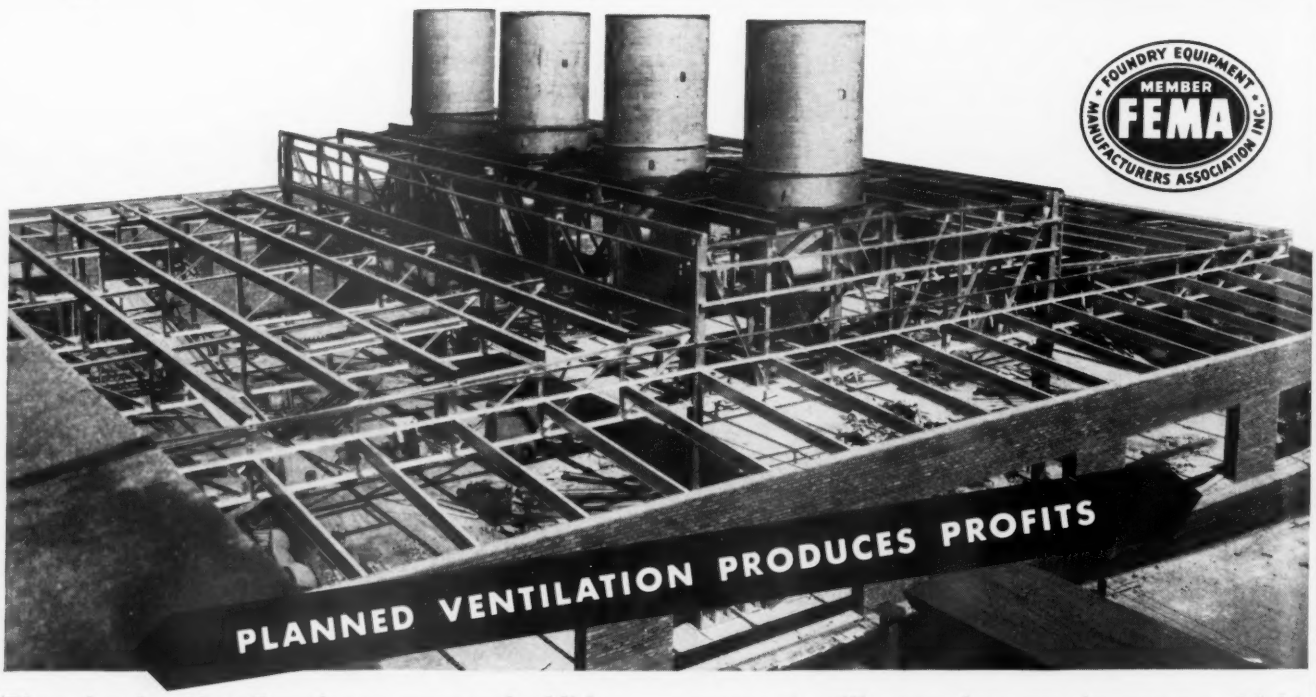
ELIMINATE *Extra* EXPENSE

include in the plans a

MULTI-WASH

System

for that new foundry or addition



Plans for that New Foundry or proposed addition should include a Schneible Multi-Wash Dust Collecting System. Important savings may be realized if Multi-Wash Collectors are installed while a foundry is being erected because (1) they may be placed in position without the need of special rigging, (2) where units are installed through or on the roof there is no need for cutting existing framework, special fitting or flashing and (3) where a large system is involved (as illustrated above) it is less expensive to move the sections to the site and erect them without interference from walls, equipment or workers.

Clean, dust-free air is a must in modern planning. Get the benefits to be derived from a Multi-Wash system, it will more than pay the expense. Multi-Wash is the ultimate of simplicity in dust control. The air is washed continuously . . . dust and fumes are removed and converted into innocuous sludge. The sludge is dewatered periodically in a settling tank for removal from the premises in a damp, dustless state; the clear water is recirculated through the system.

Multi-Wash is quiet, efficient and trouble-free . . . making it inexpensive to operate. For further information or assistance in your foundry planning, call the local Schneible engineer or write direct.

Your inquiry will receive expert attention.

CLAUDE B. SCHNEIBLE COMPANY • **P. O. Box 81, North End Station, Detroit 2, Mich.**

PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

SCHNEIBLE

MANUFACTURERS • ENGINEERS • CONTRACTORS

Late Foundry News

MARCH 26, 1952

DIRECTIVES: NPN officials are reported to be considering the need for applying directives to the procurement of those types of castings in exceedingly tight demand, including cast steel for the press and armor programs. Industry, on the other hand, feels that directives should not be applied until the entire requirements of the critical programs are spelled out and directives are applied to all materials needed for these programs which are in short supply. Leaders point out that it should not be necessary for foundries to disrupt present important production schedules to meet these urgent pleas for castings, only to have the cast parts produced and available months before the other components are ready.

STEEL CASTINGS: Industry Advisory Committee of the carbon and low alloy steel casting producers recently asked NPA to set up a committee to integrate the defense programs requiring heavy steel castings. The foundrymen said further information will have to be developed before they can assure production of the castings required for certain types of heavy aluminum forging presses needed in the aircraft program. If new facilities are needed to make these castings, then the government must finance them, the industry maintains.

FINANCIAL SURVEY: Because the gray iron foundry industry never has had reliable representative financial information covering its operation, the Gray Iron Founders' Society is arranging to have such a study made. The survey will be conducted by Ernst & Ernst, certified public accountants, and will cover statistics for the years 1946 to 1951 inclusive. Officers and directors of the society recognize the importance of such statistical information in dealing with government agencies.

INGOT PRICES: OPS issued a price regulation (CPR 127), effective Mar. 3, applying ceilings on brass and bronze ingots. Maximum prices generally are in line with the recent market, although below the tops imposed by the General Ceiling Price Regulation.

FOUNDRY EXPANSION: Latest approvals of rapid tax write-offs for expanded or new defense facilities, and amounts involved, include these foundries: Warren Foundry & Pipe Corp., Phillipsburg, N. J., $379,547; Baldwin-Lima-Hamilton Corp., Eddystone, Pa., $83,205; Diebolt Corp., Canton, O., $40,272; Buckeye Steel Castings Co., Columbus, O., $485,000; Whitewater Mfg. Co., Whitewater, Wis., $17,833; Motor Castings Co., Milwaukee, $95,039; Maynard Electric Steel Casting Co., Milwaukee, $203,786; American Foundry & Machine Co., Salt Lake City, $265,188; Donegal Mfg. Corp., Marietta, Pa., $271,406; Osborn Machine Co., DuBois, Pa., $47,914; Superior Steel & Malleable Castings Co., Benton Harbor, Mich., $37,796; L. A. Darling Co., Coldwater, Mich., $15,754; Urick Foundry Co., Erie, Pa., $398,864. DPA has established a staff to give prompt information on applications for certificates of necessity. Directed by E. C. Parker, it is in Room 4N-15, General Accounting Office Bldg., Washington, telephone Sterling 5200, extension 5261-2.

ALUMINUM SUPPLY: Defense agencies are studying the advisability of a further increase in future aluminum supplies for defense and civilian uses, as well as for the national stockpile. Aluminum Co. of Canada has offered to export larger tonnages to the United States over a period of years—up to 300,000 tons per year from 1955 through 1959. Primary aluminum producing capacity in the United States is expected to top 1½ million tons by 1953.

COPPER STILL SHORT: Although the nation's copper supply is expected to be boosted by 1955 to 2,270,000 tons, compared with 1,914,000 tons available in 1951, the immediate supply situation remains tight. NPA recently told brass and bronze ingot makers that no relaxation of controls on copper raw materials is in sight. However, scrap is moving to processors faster than was true several months ago. Lead and zinc present no major supply problems, but controls on tin are thought likely to be necessary for some time. About as much tin currently is being obtained from foreign sources as can be expected, according to NPA.

INDUSTRIAL CONSTRUCTION: NPA has approved second quarter allotments of materials for more than $7 billion of industrial expansion building projects. This represents the overall cost of the projects, not merely the value of the second quarter allotment of materials. The iron and steel and allied products program, with 285 projects, has the greatest total estimated cost—nearly $2¼ billion. More than 1250 applications for new starts in industrial expansion programs with an estimated cost of about $6 billion have been deferred for action to the third and subsequent quarters because of the exhaustion of available materials for the second quarter.

SMALL BUSINESS AID: To help small manufacturers who face shutdown because of low allotments (steel, copper, aluminum) under CMP and an inability to obtain defense work, NPA set up a Small Business Hardship Account of controlled materials to be made available to them. This is one of several moves sponsored by the Small Defense Plants Administration. Another is an attempt to assure small business a larger share of tax amortization benefits for plant expansion or improvements. Additional SDPA regional advisory boards have been established at Kansas City,

Mo., and Atlanta. The bureau eventually will have 13 boards blanketing the country.

HONOR: A cablegram from Prof. Piwowarsky advises that on Mar. 14 the University of Aachen, Germany, honored George W. Cannon, former chairman, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., "by acknowledging his extraordinary contributions in advancing the science of the foundry industry by awarding him the title of honorable doctor of engineering degree."

MORE AUTOS, FREIGHT CARS: Increased allotments of controlled materials by the Defense Production Administration supposedly will permit production in the second quarter of 1,050,000 passenger automobiles, 250,000 trucks, 21,000 to 22,000 freight cars and 800 to 850 locomotives.

PERSONALS: Dr. Walter A. Dean, chief metallurgist, Cleveland Works of Aluminum Co. of America, has been elected chairman of the Institute of Metals Division, AIME . . . J. Stokes Carswell, on leave as vice president, Gifford-Wood Co., Hudson, N. Y., has been appointed acting director of the General Industrial Equipment Division, NPA, succeeding Wesley S. Walker, Linde Air Products Co., New York . . . Henry Hecht, president, Alloys & Products Inc., New York, died Mar. 12.

MORE METAL: About 15,000 extra tons of aluminum and 10,000 to 12,000 more tons of various copper products are available to industry during second quarter; this is metal in addition to original allotments and represents tonnages the military finds it doesn't need.

REFRACTORIES EXPANSION: Productive capacity of the refractories industry will be 35 to 40 per cent higher than four years ago upon completion of planned expansion.

MISCELLANY: Expiration date for the coke price regulation has been extended by the OPS from Feb. 29 to May 31 . . . H & B American Machine Co., Pawtucket, R. I., is disposing of its textile machinery business, but is not planning dissolution of the company . . . Manufacturing employment dropped 160,000 the 12 months prior to February, but the increase in nonmanufacturing brought all employees in nonfarm industries to 440,000 more than a year ago and unemployment to a postwar low . . . Out of a total second-quarter allotment of 285,000 tons of scarce structural steel shapes for industrial expansion, nearly 100,000 tons goes to foundries, steel mills and ferroalloy and refractories producers, 42,000 tons to aluminum and magnesium plants . . . Worthington Pump & Machinery Corp. has changed its name to the Worthington Corp.

PRICES OF FOUNDRY METALS AND COKE

(As of March 26, 1952)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$17.00-18.00
New River	21.30
Wise County	15.95
OVEN	
Birmingham	$20.30
Chicago	23.00
Detroit	24.00
Erie, Pa.	23.50
Everett, Mass.	24.80
Indianapolis	22.75
Kearney, N. J.	22.75
Milwaukee	23.75
Painesville, O.	24.00
Philadelphia	22.70
Neville Island (Pittsburgh)	23.00
Portsmouth, O.	22.50
St. Louis (delivered)	25.40
Swedeland, Pa.	22.60
Terre Haute, Ind.	22.50

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$54.50	$55.00
Birmingham	48.88	....
Buffalo	52.50	53.00
Chicago	52.50	52.50
Cleveland	52.50	52.50
Everett, Mass.	57.50	58.00
Fontana, Calif.	58.50	....
Geneva, Utah	52.50	....
Granite City, Ill.	54.40	54.90
Lone Star, Tex.	48.50	48.50
Neville Island (Pittsburgh)	52.50	52.50
Steelton, Pa.	54.50	55.00
Swedeland, Pa.	56.50	57.00
Toledo, O.	52.50	52.50
Troy, N. Y.	54.50	55.00
Youngstown, O.	52.50	52.50

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5—27.25c; 88-10-2—40.00c; 80-10-10 — 33.00c; No. 1 yellow — 23.25c; No. 421 manganese bronze—30.50c.

ALUMINUM: 99 per cent plus, primary ingots 19.00c. Secondary No. 12 alloy 19.50c. Deoxidizing grades: No. 1 18.80c; No. 4 18.20c.

MAGNESIUM: 99.8 per cent standard ingots 24.50c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 24.50c, Connecticut valley; Lake 24.61½c, delivered.

ZINC: High grade 20.85c, delivered. Die casting alloy 23.65c-24.25c, delivered.

IRON AND STEEL SCRAP

(Ceiling prices per gross ton as established by the Office of Price Stabilization)

	*No. 1 Bundles	Cast Steel	**Steel, 2 ft & less	Punchings, Plate Scrap	Cast Iron Briquets
Birmingham	$39.00	$44.00	$39.00	$41.50	$39.00
Buffalo	43.00	48.00	43.00	45.50	43.00
Chicago	42.50	47.50	42.50	45.00	42.50
Cincinnati	43.00	48.00	43.00	45.50	43.00
Cleveland	43.00	48.00	43.00	45.50	43.00
Detroit	41.15	46.15	41.15	43.65	41.15
Eastern Pa.	42.50	47.50	42.50	45.00	42.50
Los Angeles	35.00	40.00	35.00	37.50	35.00
Pittsburgh	44.00	49.00	44.00	46.50	44.00
San Francisco	35.00	39.00	35.00	37.50	35.00
St. Louis	41.00	46.00	41.00	43.50	41.00
Seattle	35.00	40.00	35.00	37.50	35.00

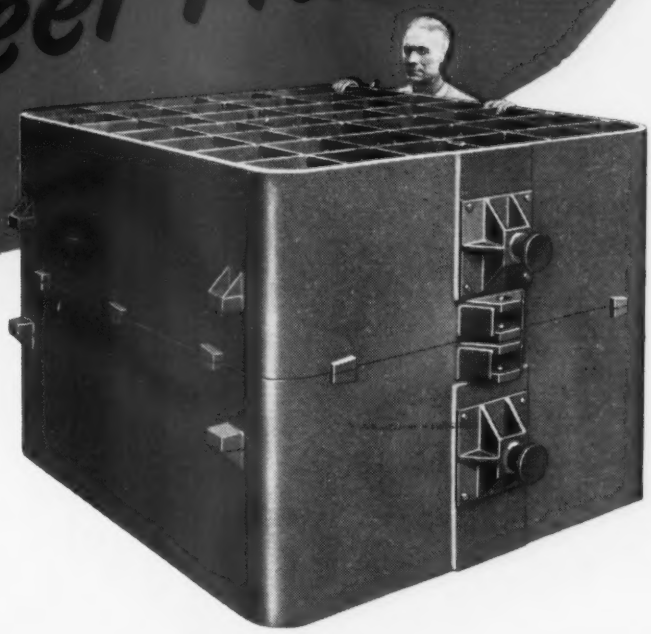
Above delivered prices are ceiling levels at basing points indicated. *Applies to dealer and industrial scrap; No. 1 and No. 2 heavy melting steel are $1 less; No. 1 railroad heavy melting is $2 higher. **$2 higher if 1 ft or under.

CAST IRON SCRAP

No. 1 cupola cast	$49.00
Heavy breakable cast	45.00
Burnt cast iron	41.00
Cast iron brake shoes	41.00
Stove plate	46.00
Clean auto cast	52.00
Unstripped motor blocks	43.00
Iron wheels, No. 1	47.00
Malleable	55.00
Drop broken machinery cast	52.00

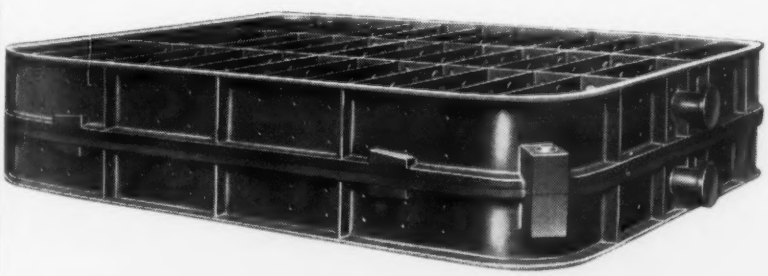
Above ceiling prices, per gross ton, are f.o.b. shipping point. Add transportation charges to obtain delivered prices at any foundry.

EVERYTHING in Steel Flasks



If you have a casting problem which requires a Flask of special shape or unusual construction —call your Shanafelt representative. He will check over the requirements with you and arrange for engineering detail and price quotations on Flasks made exactly the way you want them.

The four illustrations are typical of many special Flasks which were engineered and built here to meet special casting conditions.



Shanafelt Pins and Bushings are made solely for Foundry Flasks. The steel analysis, the tolerances and shapes, the degrees of hardening, are all based on the known requirements of Flask handling. You'll get a correct line-up of cope and drag if your Flasks are equipped with accurate, long wearing Shanafelt Bushings and Pins.

The SHANAFELT Manufacturing Co.

Serving the Foundry Industry for 57 Years

2600-2700 WINFIELD WAY N. E. • CANTON, OHIO

USCO D-3

USCO D-3 is a 4% Si—3% Cu sand casting Aluminum Alloy . . . produced from raw materials to finished ingot under our precision Production Control System.

USCO D-3 Aluminum Alloy has excellent foundry characteristics . . . insuring you of ease of melting and pouring . . . giving you gas and dross free castings. With USCO D-3 you can produce dependable, heat-treatable castings with good machinability.

The USCO stamp on your aluminum alloy ingot is a guarantee of time-tested quality. Why not join our hundreds of satisfied customers?

FREE Send for your copy of the USCO Aluminum Alloy Selector. A handy aid to analysis, specifications and many other foundry problems.

For 48 years, pioneers in aluminum development.

USCO

ALUMINUM

U. S. REDUCTION CO.

East Chicago, Indiana

MECHANIZE MATERIALS HANDLING

WITHOUT COSTLY INSTALLATIONS OR LOSS OF PRODUCTIVE TIME

use an Allis-Chalmers HD-5G and Tracto-Shovel Attachments

You speed materials handling "right now" when you put this fast-working tractor-shovel combination on the job. The HD-5G starts boosting production without waiting for costly installations or changes in plant layout. Digs into the toughest jobs, indoors or out . . . lifts, loads, excavates, pushes, tows...handles all materials, bulk, solid or packaged.

And it works easily in close quarters — turns in its tracks . . . has no bulky, overhead structure. Outdoors, the track-type tractor is not bothered by weather or ground conditions . . . works the year around, even in unpaved yards.

Choice of thirteen interchangeable Tracto-Shovel attachments makes the HD-5G a one-tractor material handling fleet. Special buckets, lift fork, crane hook, rock fork, 'dozer blades and others may be interchanged in a few minutes with simple tools.

Write for descriptive literature on the full line of Tracto-Shovels from 1 to 4 cu. yd.

LIFT FORK ATTACHMENT
Stacking Height (under forks) - - 106 in.
Lifting Capacity - - - - - 4,000 lb.

CRANE HOOK
Lifting Height (hook to ground) - - 138 in.
Lifting Capacity - - - - 5,000 lb.

HD-5G THE MODERN TRACTOR IN EVERY WAY

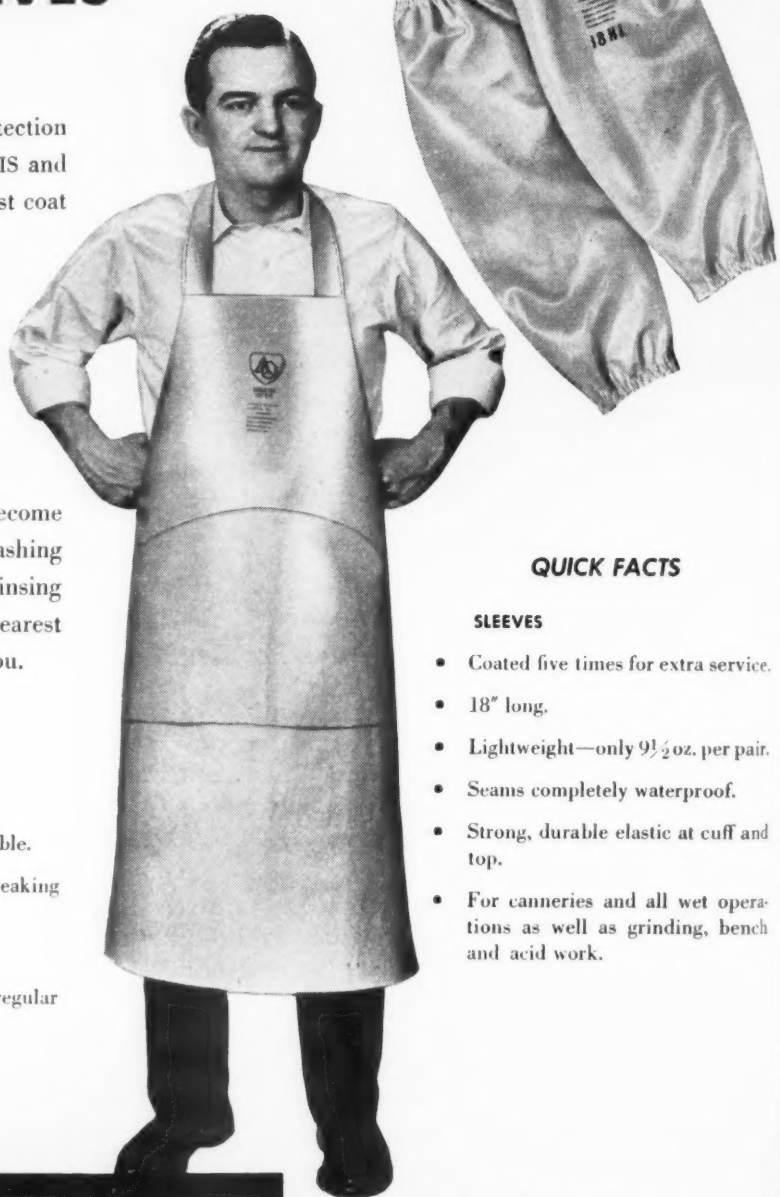
Designed For Your Job • Built To Take It • Easy To Service
Easy To Operate
40.26 drawbar hp. • 1 cu. yd. bucket
Dumping height — 9 ft., ¼ in.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Coated 5 Times... for Extra Protection!

AO "PROTECTOCOTE" NEOPRENE LATEX APRONS AND SLEEVES

PROTECTIVE CLOTHING



Here are the Number One garments for protection against ABRASION, OILS, GREASES, ACIDS, ALKALIS and SALT WATER. They're coated five times — the first coat thoroughly impregnates the fabric, then four additional coats are applied for extra protection. They won't crack, blister or peel—can withstand hard rubbing and scraping.

The base material is light, strong and durable — with comfort that means a lot to workers. What's more, AO Neoprene Latex aprons and sleeves stay flexible in cold weather—and won't become sticky in warm. They can take dry cleaning or a washing machine, brush scrubbing or petroleum solvents rinsing without harm — and they're fire resistant! Your nearest AO Safety Products Representative can supply you.

QUICK FACTS

APRONS

- Neck strap, coated on both sides, stay flat and comfortable.
- Hems are heavily coated to seal against dirt, prevent breaking and protect stitching against chemicals.
- Big 33″ width for added safety.
- Available with or without ½ round stomach patch on regular models. Gutter along bottom also available.
- Regular or split leg types available in various lengths.

QUICK FACTS

SLEEVES

- Coated five times for extra service.
- 18″ long.
- Lightweight—only 9½ oz. per pair.
- Seams completely waterproof.
- Strong, durable elastic at cuff and top.
- For canneries and all wet operations as well as grinding, bench and acid work.

American Optical COMPANY
SAFETY PRODUCTS DIVISION

AO's Industrial Vision Program *increases production, decreases accidents. Write today for free booklet "Improved Industrial Vision."*

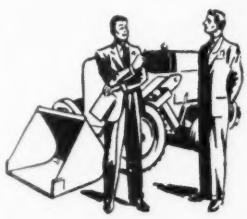
SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Laborer. 1952 MODEL

No matter how good a man may be with a hand shovel and wheelbarrow, his production is many times greater as a "PAYLOADER" pilot. What's more — both he and his boss are happier because they both make more money.

In hundreds of foundries "PAYLOADERS" have taken over unpleasant, laborious material-moving chores — saving time, cutting costs and increasing production. They scoop up, carry, dump, spread and stockpile all kinds of materials . . . lift, push . . . spot and unload box cars . . . handle sand, coal, coke, scrap, slag and ashes . . . remove snow and do many other cost-cutting jobs . . . release manpower for more productive work.

Every "PAYLOADER" is a complete Hough-built tractor-shovel *designed specifically for tractor-shovel work,* with multiple reverse speeds, large pneumatic tires and other features that insure fast, low-cost performance over floors or unpaved ground, up and down ramps, through congested areas. The "PAYLOADER" is sold by a world-wide Distributor organization with complete service facilities, and seven sizes are available from 12 cu. ft. to 1½ cu. yd. bucket capacity. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Illinois.



Visit the "PAYLOADER" booths, No's. 1730 & 1829, at the Foundry Show, Atlantic City.

JOB STUDIES

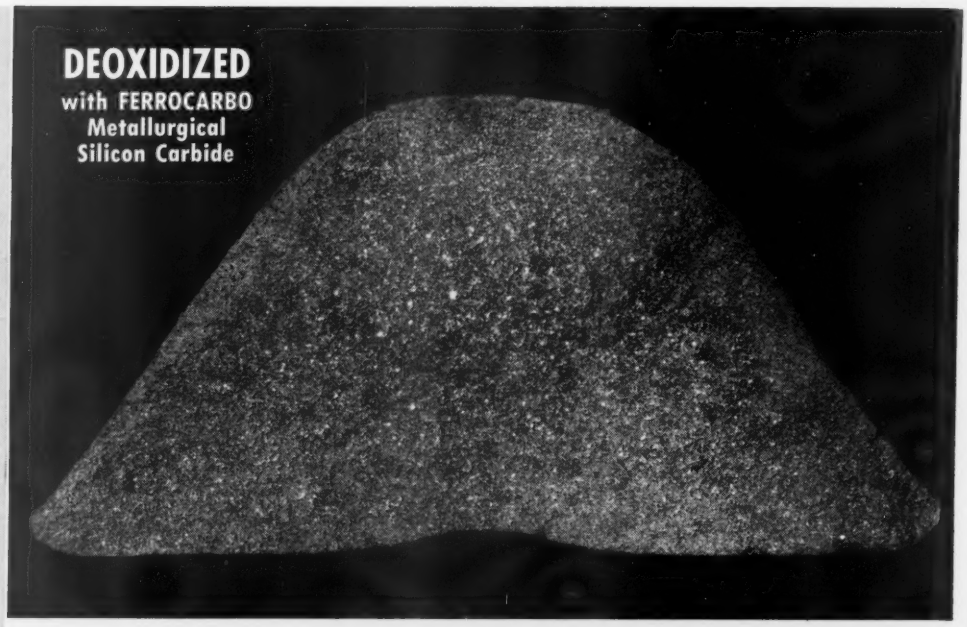
are available without cost or obligation. Each one is a detailed, authorized word-and-picture report of "PAYLOADER" performance in a specific plant. A request on your letterhead is all that's necessary.

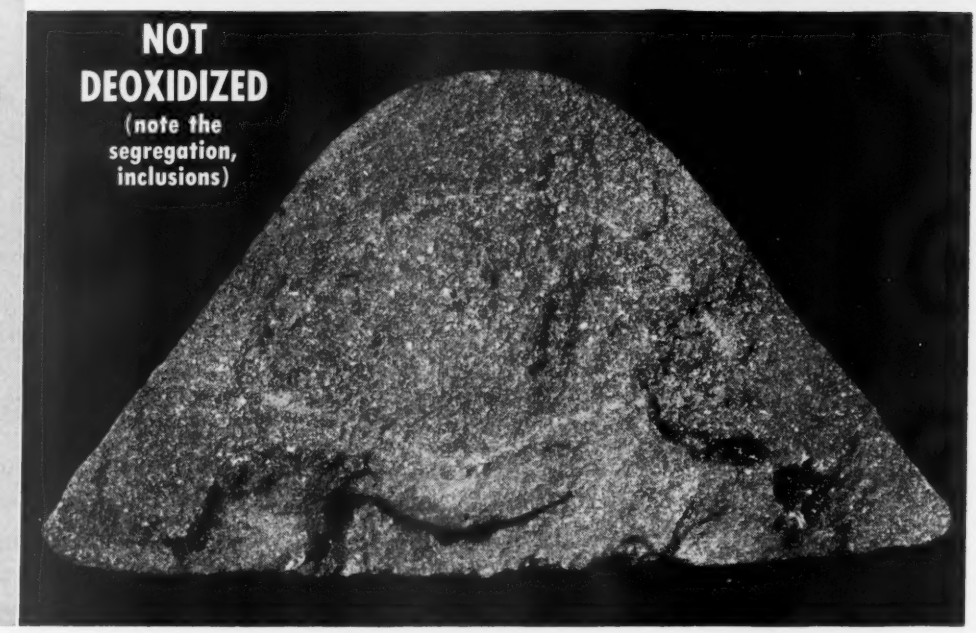
SAY "HUSH"

PAYLOADER®

THE FRANK G. HOUGH CO. · Since 1920

THESE TWO PIGS HAVE A MESSAGE FOR YOU





...even if you use a 100% pig iron charge, you need

FERROCARBO
Briquettes
to make your castings sound

FERROCARBO
TRADE MARK

DEOXIDIZING SILICON CARBIDE

Briquettes

by CARBORUNDUM
TRADE MARK

make your castings CLEANER...MORE UNIFORM...MORE WEAR RESISTANT...MORE RESISTANT TO THERMAL SHOCK...EASIER TO MACHINE (extra tool life)

"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York.

PHONE OR WRITE THE FERROCARBO DISTRIBUTOR NEAREST YOU

KERCHNER, MARSHALL & CO.
PITTSBURGH
Cleveland, Birmingham, Philadelphia and Buffalo

MILLER & COMPANY
CHICAGO
St. Louis and Cincinnati

FERROCARBO Briquettes are manufactured under U. S. Patents 2,119,521 and 2,497,745. The process of making cast iron through utilization of silicon carbide is registered under U. S. Patent 2,020,171.

Made in Canada by
CANADIAN CARBORUNDUM COMPANY, LTD.,
Niagara Falls, Ontario
Distributed by WILLIAMS & WILSON, TORONTO,
Montreal and Windsor
and by KERCHNER, MARSHALL & CO., Buffalo, N. Y.

NOW YOU CAN DO JOBS LIKE THIS

IN 10 MINUTES

WITH

VIRGO® MOLTEN CLEANER

FOR FAST, SAFE, LOW-COST DESCALING —VIRGO® DESCALING SALT

Producers and fabricators of stainless and alloy steels use Virgo Descaling Salt to quickly remove scale produced by hot rolling, forging, extruding, casting, annealing.

The Hooker Process is backed by 15 years' experience in molten salt bath descaling and cleaning. Engineering, research and on-site operating assistance are part of our service.

SEND FOR THESE BULLETINS

Get the whole story on Virgo Molten Cleaner and Virgo Descaling Salt—what they are, how they work, their advantages, equipment involved, and the Hooker services you enjoy as a user of the process. Send for these bulletins today.

NEW, FAST *DESANDING, DEGRAPHITIZING* PROCESS

Saves You Up to 300 Hours per Month!

You can desand and degraphitize iron and steel castings in 10 minutes—or less—with Virgo Molten Cleaner.

Here's what you get: a *chemically clean* metal surface. No pitting or etching. No effect on dimensional stability. Any surface defect in a casting shows up clearly.

Here's how it works: a molten salt bath dissolves sand and graphite from every nook and cranny of the most intricate casting. A water quench, a dip in dilute acid, and a brief hosing with water complete the job.

You can use Virgo Molten Cleaner for stress relieving, too. Grey iron, carbon steels and some alloy steels can be stress relieved *while desanding*—in much less time than is required in a furnace.

This fast, safe process is easily adapted to your production methods. For full details, mail the coupon or write us today.

HOOKER CHEMICALS ®

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

20 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
NEW YORK, N. Y.
WILMINGTON, CALIF.
TACOMA, WASH.

1-1465

Hooker Electrochemical Company
20 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.

Please send me Bulletins checked: Virgo Descaling Salt ☐ Virgo Molten Cleaner ☐

NAME_____

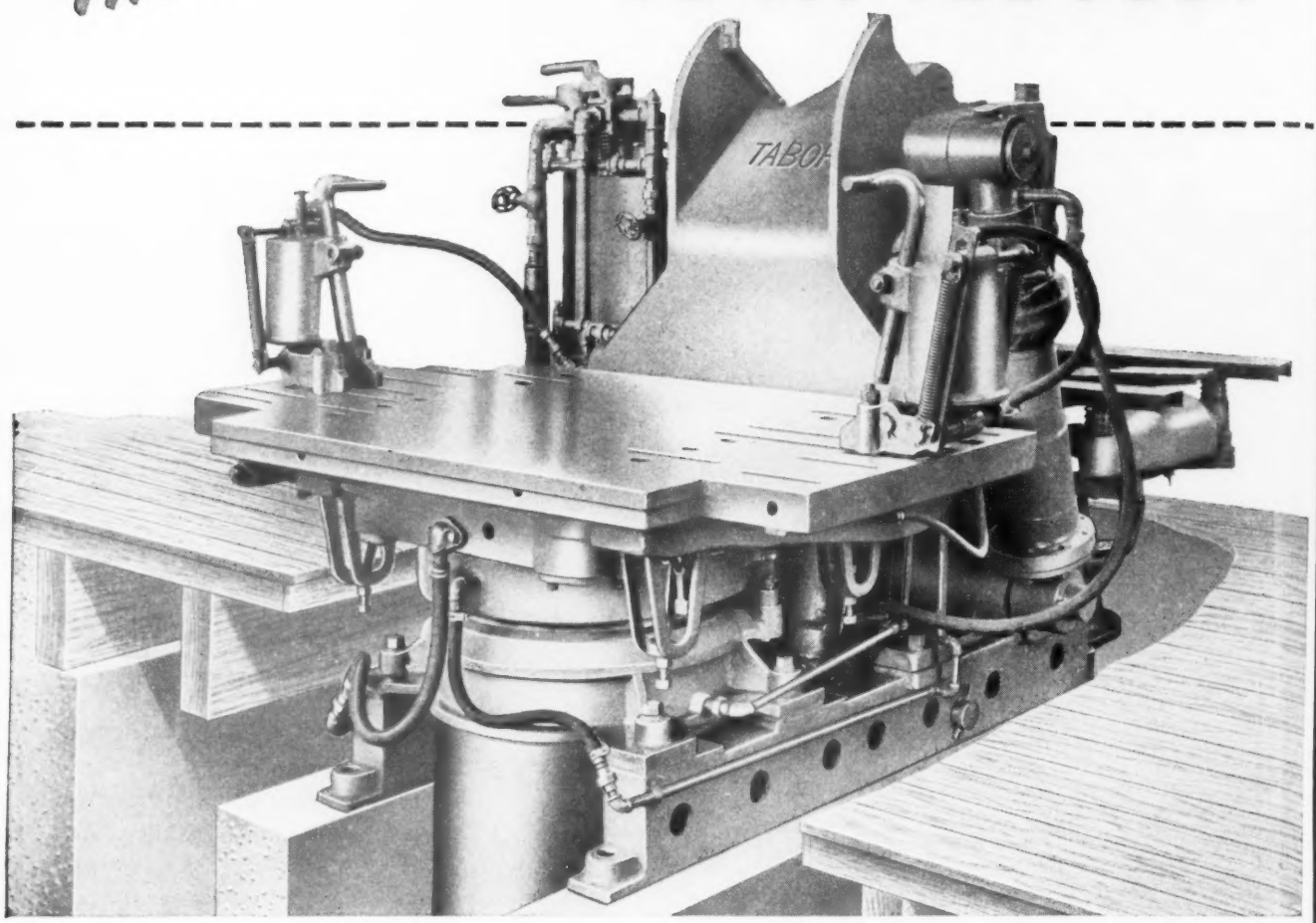
TITLE_____

ADDRESS_____

COMPANY_____

CITY_____ ZONE____ STATE____

There's A TABOR ROLLOVER TO FIT THE JOB!



PICTURED is only one of Tabor's large and diversified family of foundry-proved Rollovers. This one's a 3,000-lb. capacity, *shockless* job. The rollover plate is 40" wide x 50" long. When air-operated flask clamps are used (as shown), it handles pattern boards ranging in length from 24" to 56". Even with modest pit requirements, the plate is only 15" above floor level for easy workability. Accommodates a 43" deep flask (including pattern board and bottom boards)—minus the draw required. Maximum draw on the unit shown is 15". With modifications we can provide for a 55" flask depth on the basis outlined above, and a 20" draw.

Tabor Power Rollovers run the gamut of size and type. They range from 450-lb. to 3,000-lb. capacity. All are *completely* power-operated and can be furnished with air-operated flask clamps. You can choose between plain or shockless jar, and some types are portable. All incorporate Tabor's famous air-on-oil principle for a perfect draw. All perform up to full rated capacity, completing a cycle of operations in the fractional part of a minute.

Complete Rollover family is presented in Bulletin #514—just off press. Write for your copy. Then team up with Tabor for a quick and satisfactory solution to any Rollover problem.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif., The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H Reich, Trussville, Ala

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

EXPORT DEPARTMENT, 765 DREXEL BLDG., PHILA. 6, PA.

HERE ARE 5 ways

A DRAVO *Counterflo* HEATER* CAN WORK FOR YOU!

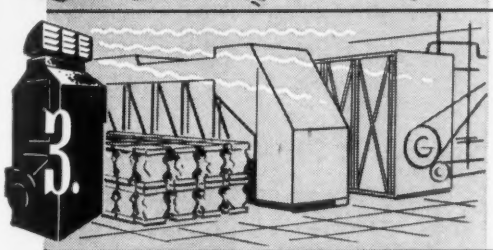
*DIRECT-FIRED

COMFORT HEATING *(commercial and industrial)*

Dravo Heaters have a 150-foot air throw and recirculate warm air at the working level, giving maximum comfort with minimum roof heat loss. No expensive pipe covering, radiators or ducts required. Quick warm-up; automatic on-off or modulating controls.

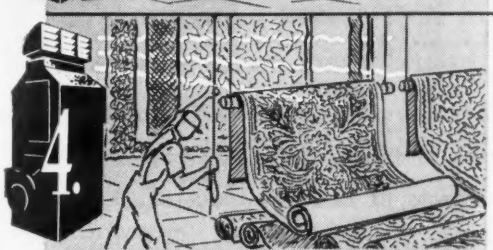
TEMPERING MAKE-UP AIR

Where dust-filled or fume-filled air must be removed from a building by exhausters, this air can be replaced and tempered by Dravo Heaters. Equal pressure is maintained . . . working conditions are kept comfortable.



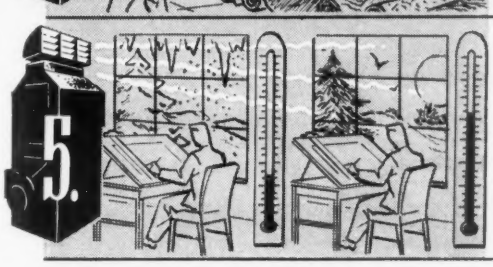
HEAT CURING

Dravo Heaters can be used independently or in combination with other equipment for process curing concrete, plastics, paper, fibre containers, rubber and many other products. Automatic temperature controls keep air flow at desired temperature.



PROCESS DRYING

Moisture content of air can be controlled or removed entirely by using fresh or recirculated air. Immediate response to temperature controller demand makes it ideal for drying paint, farm crops, wood products, rugs (after cleaning) and many other processes.



YEAR-'ROUND VENTILATION

In addition to comfort heating, Dravo Heaters provide fresh-air ventilation in warm weather and can be easily tied in with air-conditioning systems.

DRAVO HEATER *Plus* VALUES . . .

- **Low initial cost . . . users report 30% to 60% savings on installation.**
- **Direct-fired . . . low fuel consumption . . . burn gas or oil . . . readily converted.**
- **Long service life, low maintenance . . . stainless steel combustion chamber eliminates refractory lining.**
- **Easily moved to any location to fit your requirements.**
- **Flexibility . . . can be mounted horizontally or vertically on floor, walls or ceiling.**
- **Available in sizes from 400,000 to 2,000,000 Btu/hr.**

WRITE FOR MORE INFORMATION. It's worth your while to look into Dravo *Counterflo* Heaters for any of these five functions shown above. You'll be glad you did. Ask for Bulletin No. ST-5

DRAVO CORPORATION

HEATING DEPARTMENT
Dravo Bldg., Fifth & Liberty Ave.
PITTSBURGH 22, PA.

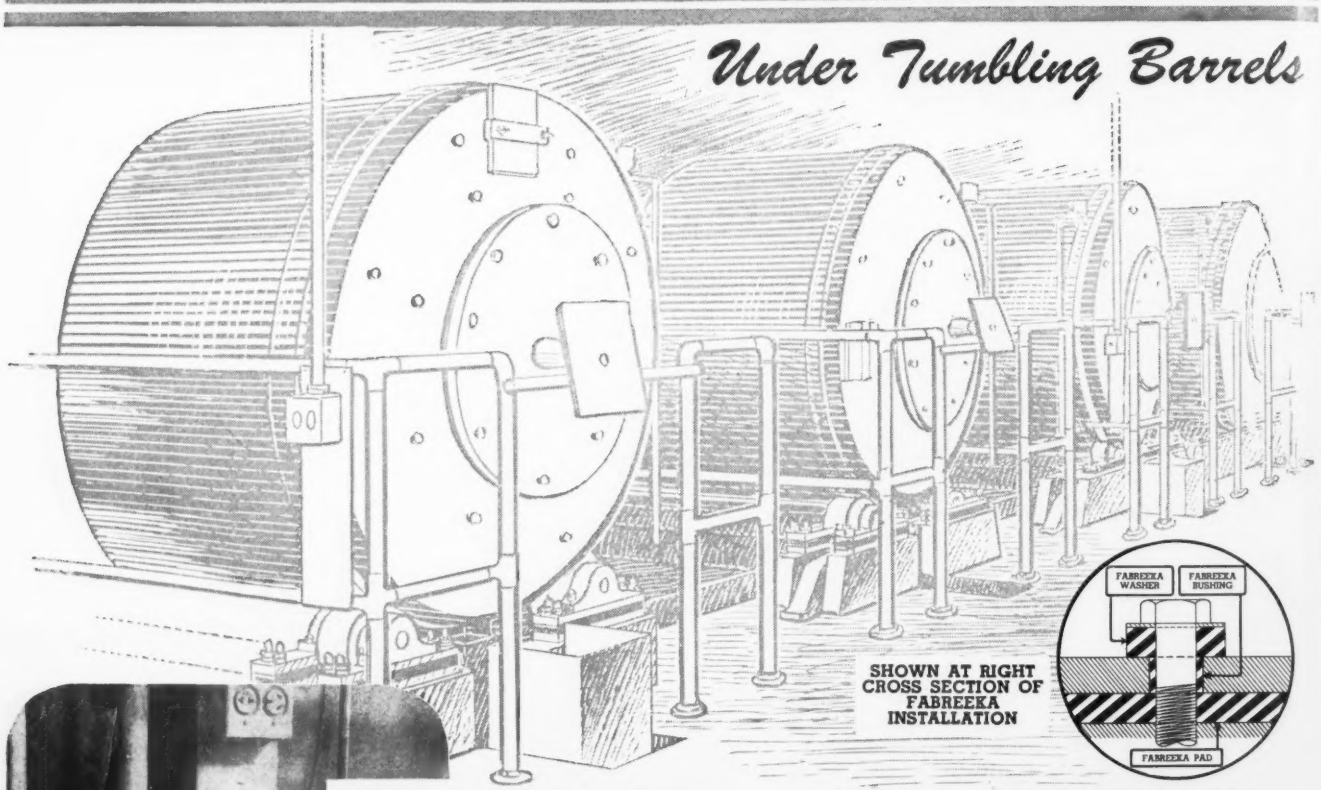
ATLANTA • BOSTON • CHICAGO • CLEVELAND • DETROIT • NEW YORK • PHILADELPHIA • PITTSBURGH
Sales Representatives in Principal Cities

Manufactured and sold in Canada by Marine Industries, Ltd., Sorel, Quebec

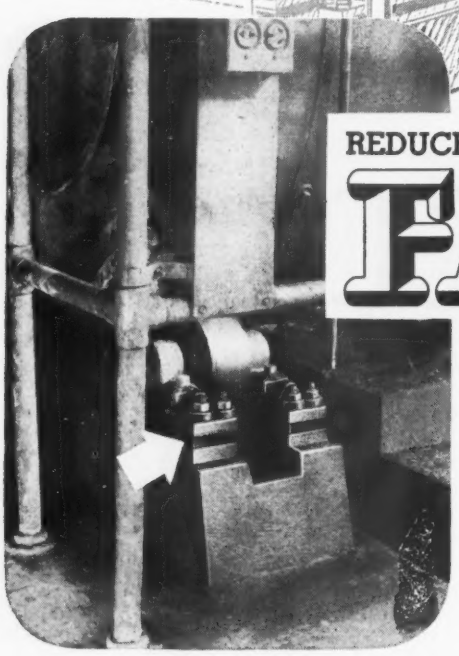
Export Associates: Lynch, Wilde & Co., Washington 9, D.C.

for IMPACT SHOCK and VIBRATION

Under Tumbling Barrels



SHOWN AT RIGHT CROSS SECTION OF FABREEKA INSTALLATION



REDUCE MAINTENANCE and INCREASE PRODUCTION with

FABREEKA

FABREEKA Pads, bushings, and washers are installed under Jolt Moulders, Shakeout Machines, Tumbling Barrels and other heavy machinery to reduce the effects of heavy impact shocks and destructive vibration.

FABREEKA has demonstrated its ability to prevent breakage of machine parts and to keep bolts tight, thereby reducing maintenance and increasing production.

In addition to these important advantages, Fabreeka has long life, which makes its final cost a low cost.

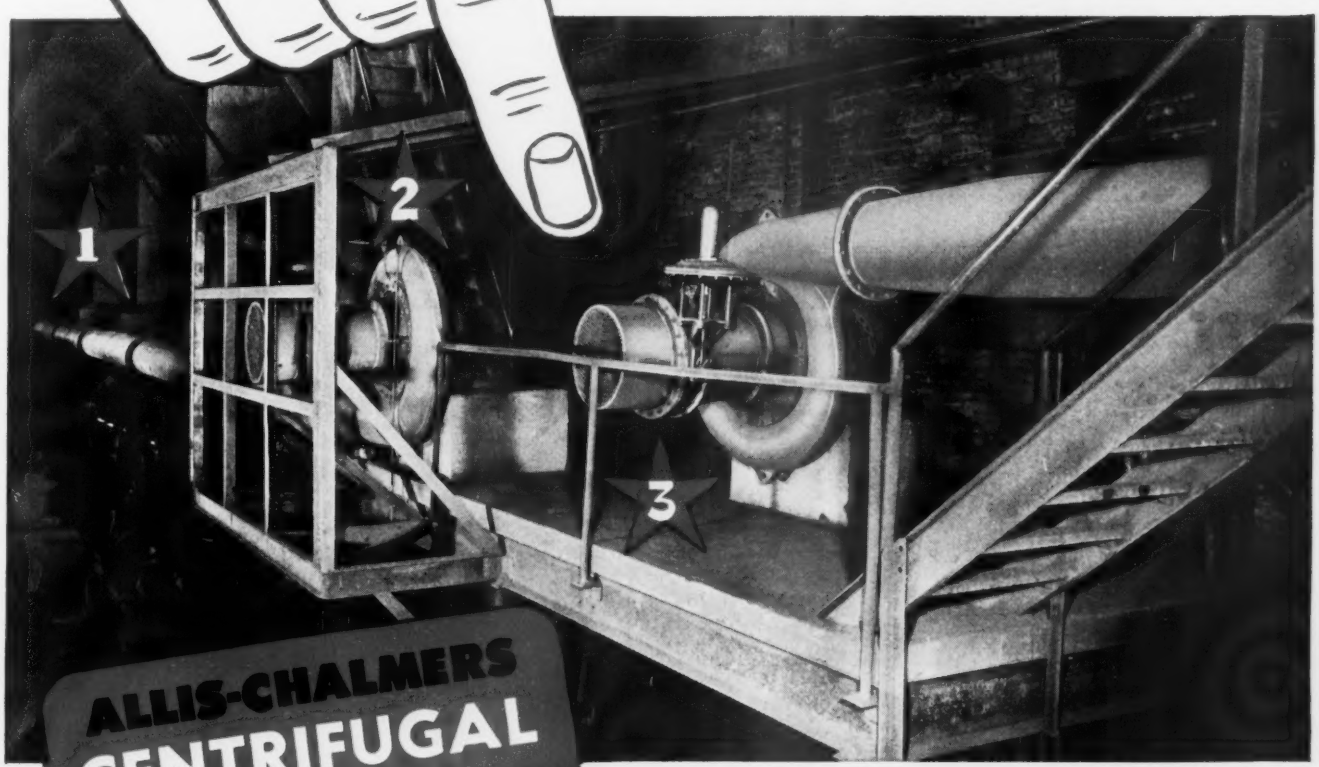
Write for latest literature

It Pays to Specify Fabreeka

FABREEKA PRODUCTS COMPANY INCORPORATED

222B SUMMER STREET BOSTON 10, MASSACHUSETTS

3 Blowers SERVICE 6 CUPOLAS!



ALLIS-CHALMERS CENTRIFUGAL BLOWERS

Three Allis-Chalmers 60-hp motors and centrifugal blowers perform double duty by supplying the air needed by six cupolas at this large foundry. Blowers each rated 5750 cfm, 1.75 G, 3550 rpm.

SIX CUPOLAS ARE KEPT ON THE JOB by *three* Allis-Chalmers centrifugal blowers in the foundry of this large midwestern machinery manufacturer.

These three Allis-Chalmers blowers (one at end of pipe out of camera range at left) supply three cupolas at a time . . . alternate ones are shut down for lining maintenance between melts. For *six years* these blowers have kept this up, switching from one cupola to another, and with only routine maintenance, *no repairs!*

Both reliability and precision output are vital here. All foundry operations rely on the four grey iron and two malleable iron cupolas. Cupola operation is especially critical where malleable iron is concerned, since the component elements demand precise control.

The constant air weight control on the blower inlets automatically delivers a metered amount of air to insure uniform melts. There is no necessity of blowing off to atmosphere and wasting power, as with positive pressure blowers.

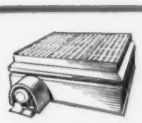
The cast iron casing reduces vibration, lowers noise level, and gives long life impossible with fabricated construction. With the impeller "overhung" on the motor shaft and supported by anti-friction bearings, the installation is compact and readily accessible.

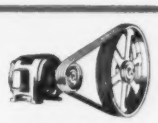
For the full story call your nearest A-C sales office or write to Allis-Chalmers, Milwaukee, 1, Wisconsin for Bulletin 16B6048B. A-3548

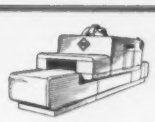
Foundromatic and Regulex are Allis-Chalmers trademarks.

ALLIS-CHALMERS

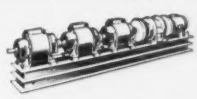
Foundry Equipment for Bigger Output-Better Working Conditions!

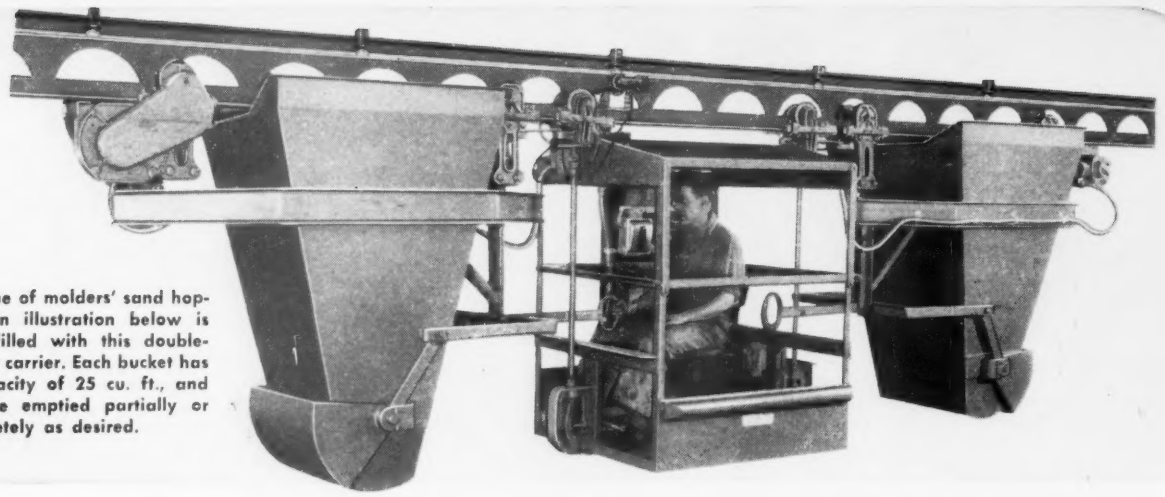

Foundromatic Shakeouts


Motors-Drives-Control


Foundromatic Core Dryer

Induction Heating & Melting


Regulex Arc Furnace Control



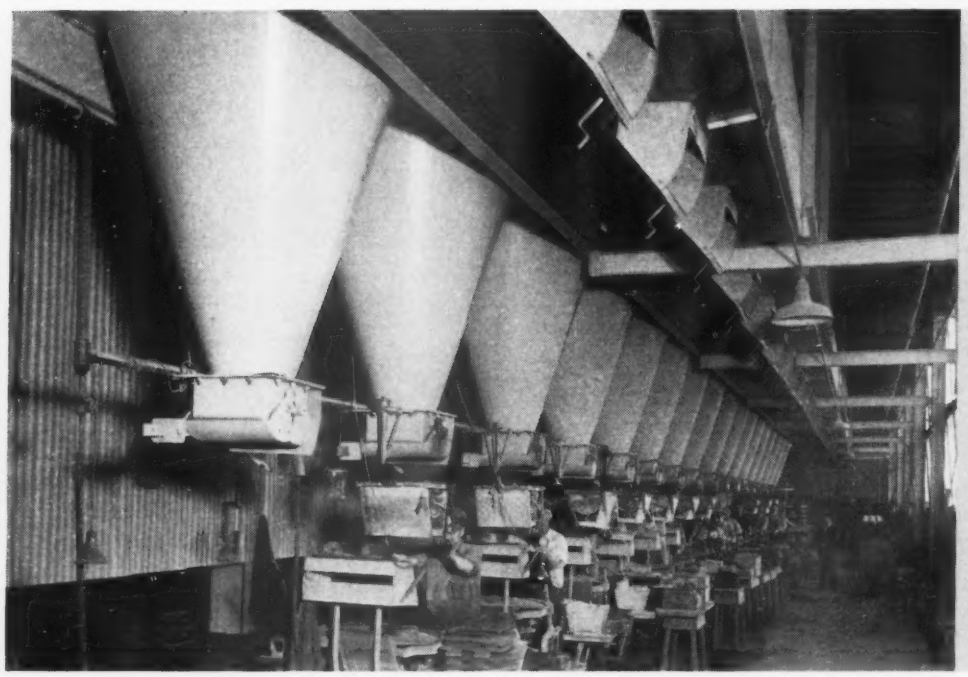
The line of molders' sand hoppers in illustration below is kept filled with this double-bucket carrier. Each bucket has a capacity of 25 cu. ft., and can be emptied partially or completely as desired.

Tramrail Bucket Carrier Speeds Sand to Molders

Do you have 10 or more molders? Do you produce large castings?

Then This Carrier Offers You Important Advantages

If your foundry is of medium or large size, either using a considerable volume of core or molding sand, or requiring sand distribution to a number of points, you should look into the possibilities of a Cleveland Tramrail cab-operated bucket carrier operating on overhead trackage. Consider these advantages:



1. High speed delivery from muller to molders.
2. One Tramrail unit serves many molders.
3. Greatly reduces sand spillage and aids cleanliness.
4. Sand carried in buckets does not lose its moisture content.
5. Easily adapted to foundry layouts of all types. Not confined to straight-line layouts.
6. Long track life is assured because tracks are high carbon with raised wearing treads.
7. Equipment has very few wheels and bearings to require attention.
8. Low overall maintenance.
9. Because of ease of erection or dismantling, Tramrail Systems are easily re-arranged or extended to suit new conditions as they arise.
10. Cost of equipment and operation usually lower than for other mechanized methods.
11. Tried and proven for many years in many foundries.

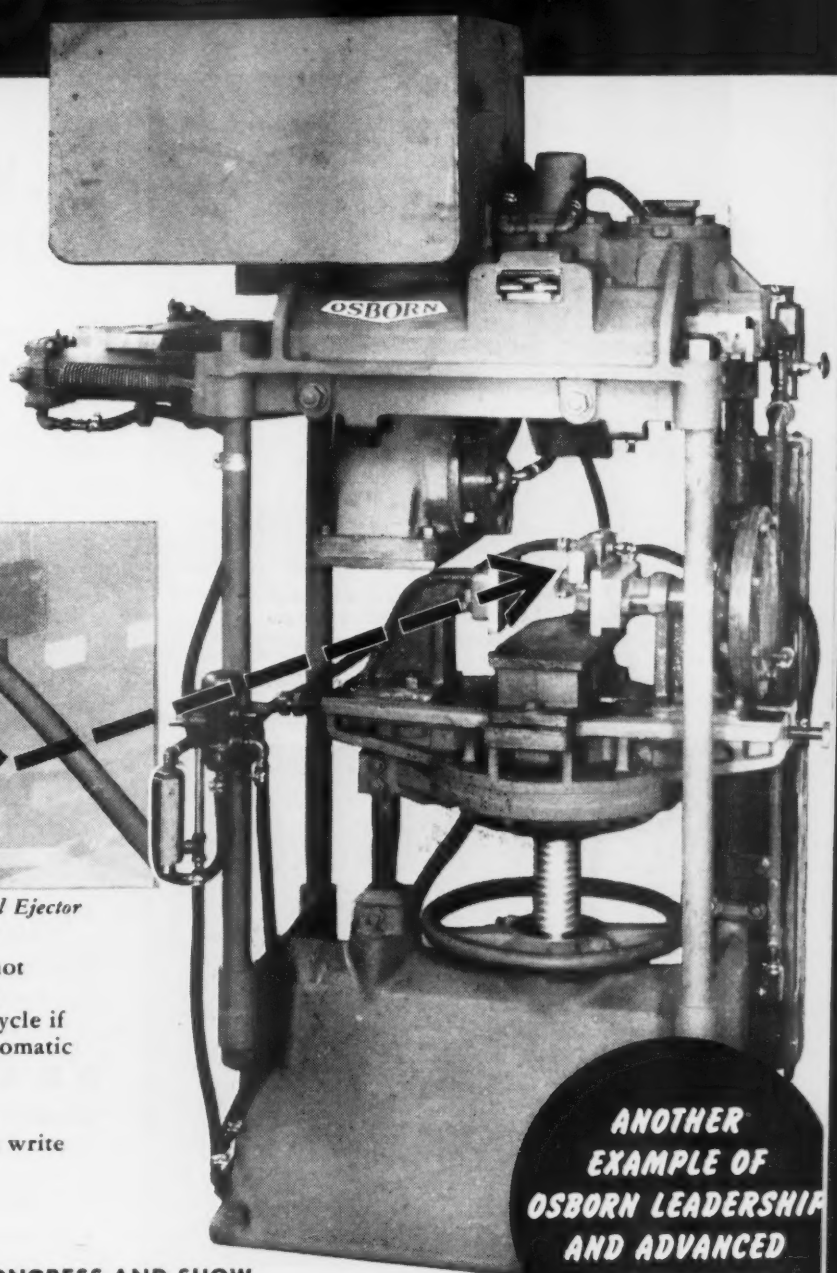
GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3834 East 286th St. Wickliffe, Ohio.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

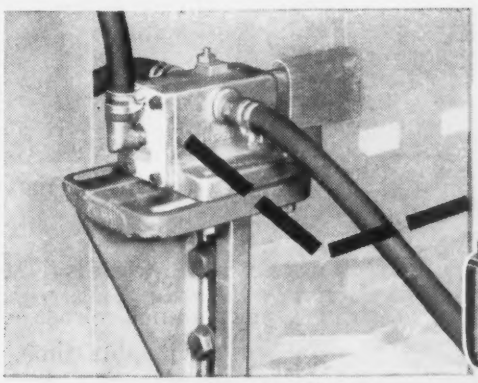
NEW CONTROLS
for Osborn Core Blowers



• **Automatic Controls with Core Box Ejector.** Cycle automatically initiated by core box when in blowing position on table.
Cycle automatically terminated after core is blown and box is ejected.

• **Fast Efficient Production.** Used on double box operations. Particularly suited for vertically parted core boxes. OPERATOR STRIPS ONE BOX WHILE OTHER IS BEING AUTOMATICALLY BLOWN.

• **Preset Time Cycle.** Machine operating cycle 3½ to 4 seconds. Since machine generally waits for operator, production is determined by speed at which cores can be stripped and racked.



Core Box Starting Control Ejector

• **Simple to Operate.** Workman needs only to insert core box. Machine automatically starts and goes through the blowing cycle, ejects core box and stops.

• **Proven Safe.** Speeds of various elements in automatic cycle are adjustable to suit requirements of job. Machine will not repeat cycle until operator initiates starter control by inserting core box. Emergency safety button to stop cycle if core box is loaded incorrectly. Sequential type air automatic controls. No electricity required.

• **Get the Facts.** Your factory trained Osborn foundry specialist will gladly furnish complete details. Call or write *The Osborn Manufacturing Company, Dept. 697, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

ANOTHER EXAMPLE OF OSBORN LEADERSHIP AND ADVANCED ENGINEERING

VISIT OUR BOOTH, INTERNATIONAL FOUNDRY CONGRESS AND SHOW ATLANTIC CITY, MAY 1-7

OSBORN®

MOLDING MACHINES · CORE BLOWING MACHINES · INDUSTRIAL BRUSHES

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue Cleveland 14, Ohio

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

WHY DO THINGS *The Hard Way...*

Unretouched photos show ease and speed of changing bags: quick-release clamp is removed in seconds—

—filter bag then slips off lower collar. Top end of bag is removed and replaced with similar ease.

...WHEN DRACCO FILTER MAINTENANCE IS SO EASY?

The special mechanical design of Dracco Dust Control Equipment reduces filter maintenance in two important ways:

1. **Dracco Filters last longer**

   —skilled engineering and accurate manufacturing prolong the life of filter bags and moving parts.

2. **Replacing Dracco Filter bags is simpler**

   it's *easy*—no awkward, unwieldy frames or screens to move in and out of filter housing.

   it's *clean*—all work is done on clean air side.

   it's *fast*—quick-release clamping devices save valuable time.

Dracco Dust Control Equipment has many other superior features which will provide an economical solution for your dust problem. Why not call in Dracco today?

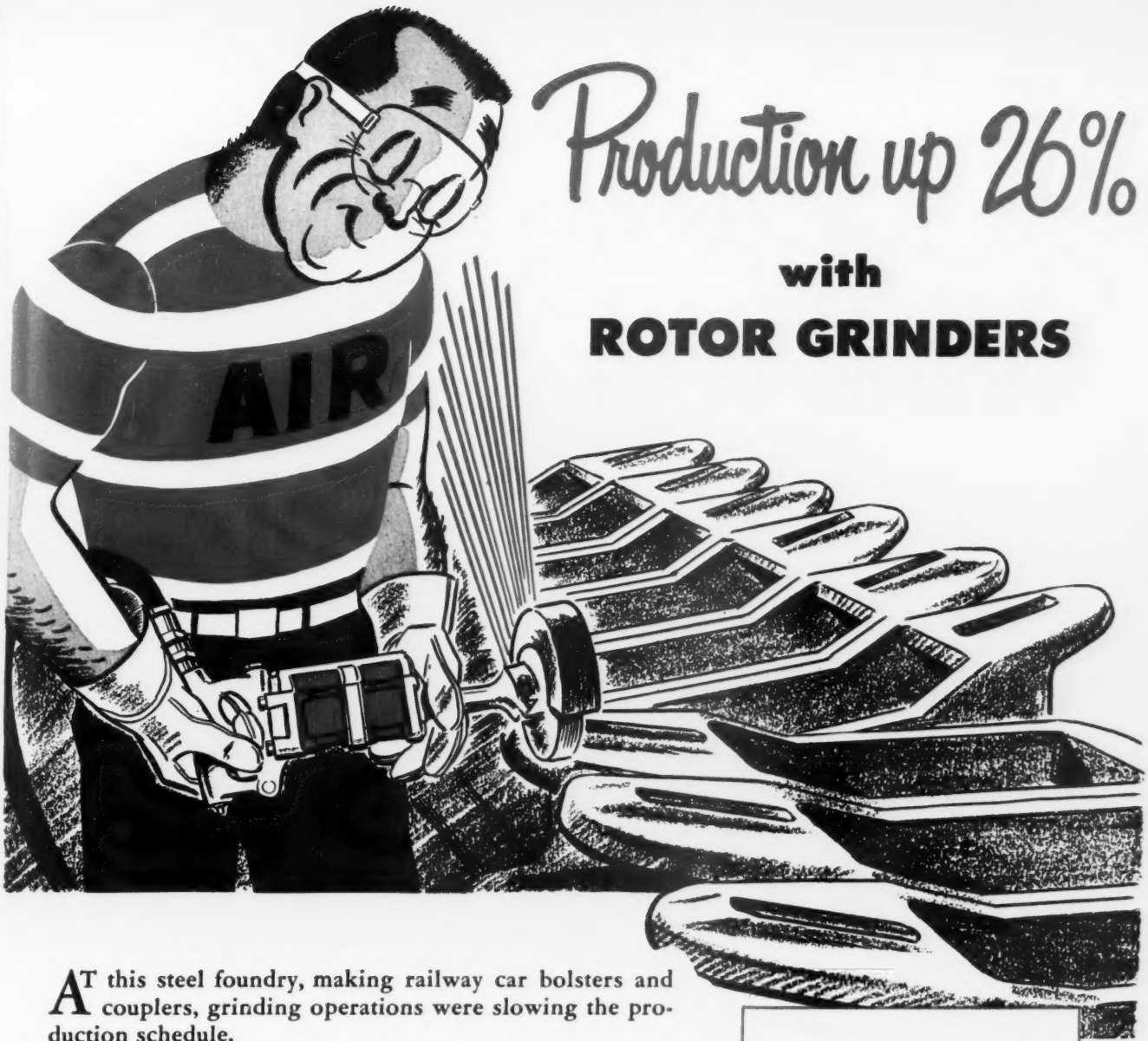
DRACCO CORPORATION

Harvard Avenue and East 116th St. • Cleveland 5, Ohio

Write today for the Dracco Engineering Data Sheet which will facilitate an analysis of your dust problem. Address Dept. G-4, Cleveland 5, O.

DRACCO *Performance Proved*

DUST CONTROL EQUIPMENT • PNEUMATIC CONVEYORS



Production up 26%

with ROTOR GRINDERS

AT this steel foundry, making railway car bolsters and couplers, grinding operations were slowing the production schedule.

PROBLEM: Need for more finished pieces per day. Reduction of high wheel cost. Reduction in "down time" of equipment for repairs. Formerly used 8″, 13-pound grinders.

SOLUTION: Rotor Application Engineer recommended 6″, 6,000-rpm Rotor Grinders. Weigh only 9¾ lbs.

RESULTS: Production stepped up 26%. Less operator fatigue. Wheels last longer. Finishes are better.

The Rotor Application Engineer can help *you* too. Call or write for Catalog #38.

ROTOR GRINDER FACTS

SPEEDS
3100 to 21,000 R.P.M.

WEIGHTS
4″ grinder—8¾ lbs.
6″ grinder—9¾ lbs.
8″ grinder—11¼ lbs.

HANDLES
Straight or Spade.

AIR O'TOOL

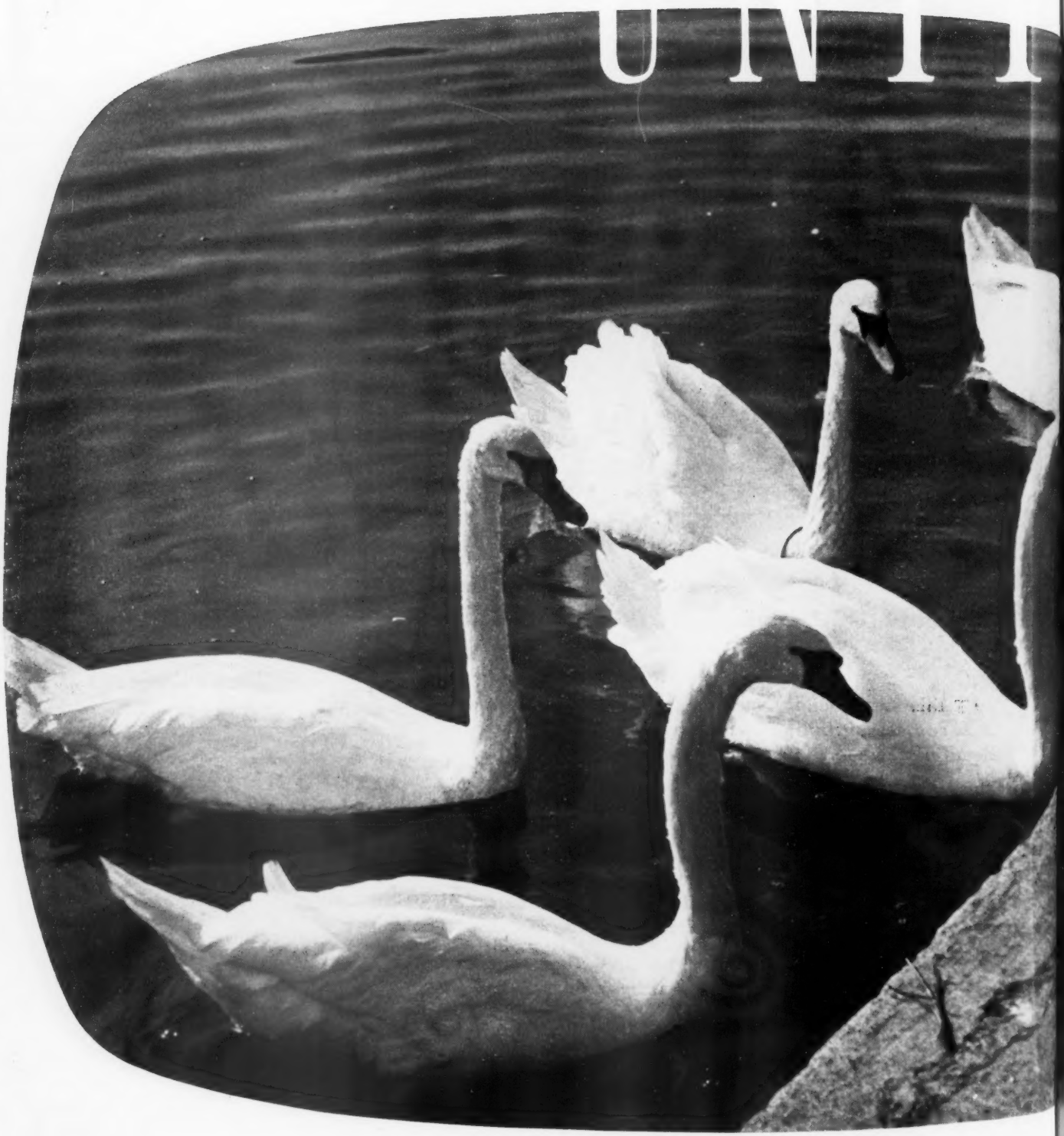
AIR

ROTOR TOOL

HIGH CYCLE

THE [illegible] CO.
CLEVELAND OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



The Mute Swan is not a native bird, having been introduced from Europe. Nor is it mute, for when angry it hisses and when calling its young it makes a noise similar to the bark of a small dog. In England, the swan is regarded as a royal bird and ownership must be approved by the crown. This is an ancient custom, enacted in 1482 during the reign of Edward IV. To this day, the swans on the Thames belong to the crown and two city companies, all three having distinct "swan-marks" on their respective birds.

The Mute Swan, the swan of our parks and country estates, is another of Nature's families distinguished by identical appearance. This uniformity is especially noticeable when a group of swans, such as shown here, gathers at the edge of a lake or glides with ease and grace over the water.

HINES Pins and Bushings, too, are noted for uniformity. Carefully machined from the finest steel, hard chrome plated and precision ground to .002″ tolerance, they possess accuracy and uniformity rarely, if ever, found in nature. For pins and bushings that assure quick, accurate alignment, won't rust, don't require lubrication—pins and bushings that will give exceptionally long, satisfactory service—it's HINES!

HINES Flasks, Jackets, Upset Frames, Pins and Bushings will be displayed at the International Foundry Congress and Foundry Show, May 1-7, at

BOOTH NO. 1236

PINS AND BUSHINGS

THE HINES FLASK CO.,

3431 WEST 140TH STREET, CLEVELAND 11, OHIO · TELEPHONE: ORCHARD 1-2806

*Overcured Sections — present every 30′ to 40′ in all belts made by the flat press method. Only Rotocuring (continuous, non-stop curing) eliminates this major cause of belt failures.

Here Lies a Good Conveyor Belt ...killed by OCS*

—BWH ROTOCURE prevents these fatalities — look for it in the belts you buy

Press overlaps, inherent in belts cured by flat press methods, are a primary cause of early belt failure. The overlaps result in overcured segments 2″ to 4″ wide across the entire belt because vulcanization is *not* continuous. These 2″ to 4″ segments are *double cured* — and *double curing weakens the structure!*

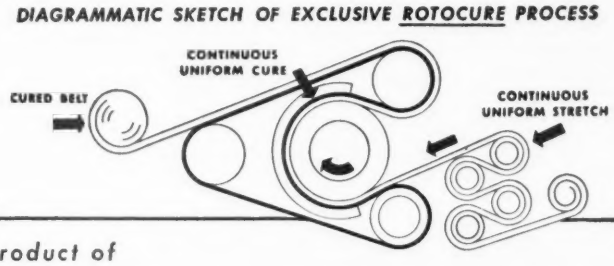
When you buy a BWH conveyor belt made by the *continuous* ROTOCURE process of vulcanization you obtain a *uniformly strong* belt *overall.* The weakened segments due to overlapping that sabotage operations and inflate belting costs are completely eliminated. With continuous, endless vulcanization you'll be ahead four ways:

1. In increased belt flex life — as much as 40%
2. In elimination of mechanical distortion at the press ends
3. In constant, uniform stretch
4. In uniform, abrasion-resistant covers

These characteristics of BWH Conveyor Belts mean minimum belt maintenance costs, longer belt life and appreciable per ton savings in the cost of what you convey! Ask your BWH distributor to show you how these highly serviceable belts can help you. Or write us direct.**

**Ask him also about BWH Rotocured Transmission Belts. Because they permit operation at lower tensions, you are assured of longest possible belt life.

DIAGRAMMATIC SKETCH OF EXCLUSIVE ROTOCURE PROCESS



BWH
DEPENDABLE RUGGEDNESS

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P.O. BOX 1071, BOSTON 3, MASS., U. S. A.
WAREHOUSE STOCK, 111 NORTH CANAL ST., CHICAGO, ILLINOIS

HERE'S HOW...

CHICAGO TRANSIT AUTHORITY CUTS MELTING TIME IN HALF

. . . cuts fuel cost 50% . . . cuts metal losses 40%

Chicago Transit Authority, one of the world's largest transportation systems, operating 2,400 streetcars, 1,625 elevated cars, and 1,100 buses, installed a Fisher oil fired Simplex Melting Furnace for remelting, reclaiming scrap, brass, and bronze. Journal and axle bearing brasses and worn parts from all types of rolling stock are melted down and recast into new parts.

The new Fisher Simplex replaces a conventional oil fired spherical type open flame furnace. Check this "Before and After" story of faster melting, lower fuel cost, and lower metal losses.

	BEFORE	AFTER
Heating time 1000 lb. charge	2½ hrs.	1 hr.
Fuel cost per pound melted	$.0056	$.0027
Metal Loss	5%	3%

FISHER ADVANTAGES

Furnace charges *easily* from front at convenient height. . . . More scrap can be charged because of large area above molten metal line. . . . Uses open flame reverberatory melting, the *fastest* fuel fired melting method. . . . Two section furnace shell removable for *easy* relining.

Ask for bulletin #28-A "Fisher Simplex Furnaces."

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.

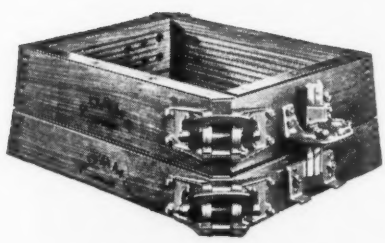
2453 West Hubbard Street, Chicago 12, Illinois

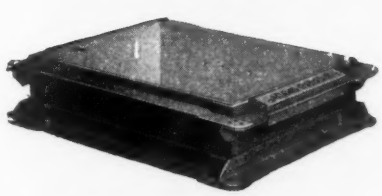
Partners in Production

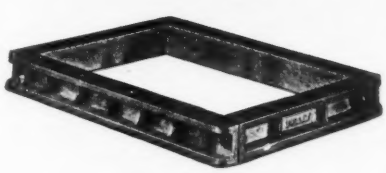
Adams 12"-38"
Jolt Squeezer
Portable Type

ADAMS

MOLDING MACHINES and CUSTOM-BUILT FLASK EQUIPMENT







HERE are the "Partners" that keep production rolling and costs low . . . help you meet today's increasing competition with *faster* production of *better* castings at lower cost.

Adams Molding Machines are designed by experienced foundrymen to solve your production problems . . . to give you the speed, power and durability for consistently large output day after day. Close control of jolting and squeezing operations means accurate, uniform molds. Smooth, easy operation, with minimum working parts, simplifies operations and maintains steady, high output levels.

Adams Flasks are custom built to your exact specifications for superior performance and economical production.

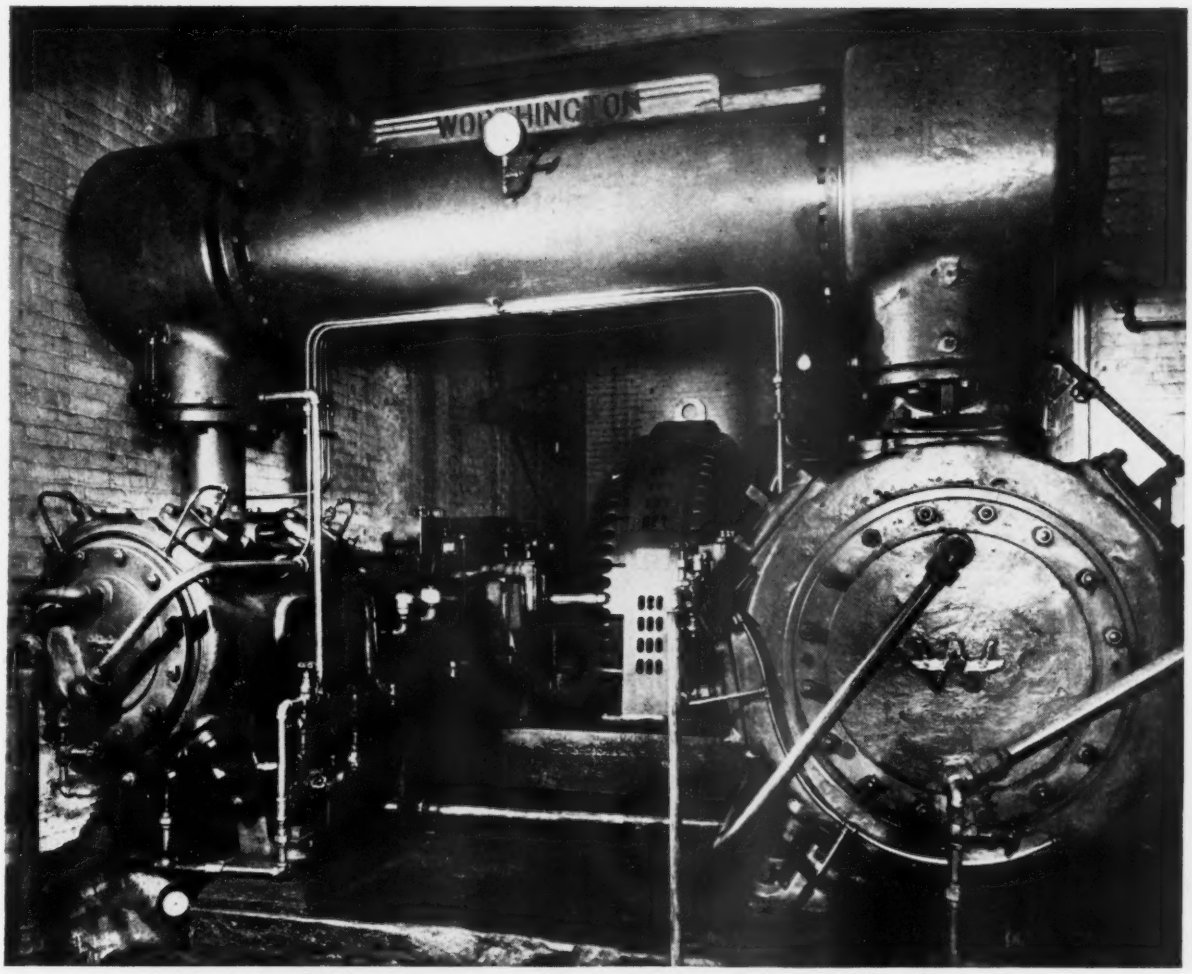
Get these "Partners" on your production team now! Write for full information. THE ADAMS COMPANY, 700 Foster Street, Dubuque, Iowa.

The ADAMS Company

ESTABLISHED 1883

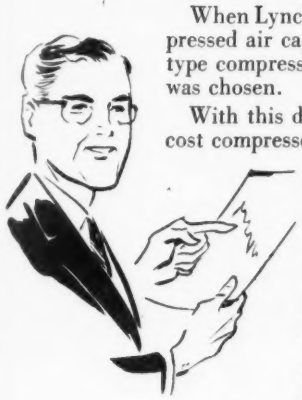
MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.



Worthington DC-2 horizontal air compressor at Lynchburg Foundry Co., Lynchburg, Va.

It Saves Power Costs At Every Load



When Lynchburg Foundry Co. wanted additional compressed air capacity . . . more than its Worthington Y-type compressor could handle . . . a Worthington DC-2 was chosen.

With this duplex compressor, Lynchburg gets lowest-cost compressed air and longest compressor life.

LESS DEMAND ON MOTOR WHEN THERE'S LESS DEMAND FOR AIR

Five-step capacity control permits matching the pumping rate to the varying amounts of air required. This reduces power consumption at partial load.

Worthington's five-step capacity control governor is exceptionally sensitive because it performs *only pilot duty*. The actual unloading is done electrically and pneumatically. But the pumping rate is continuously under the *control* of the governor. With decrease or increase in demand, the governor causes the compressor to unload or reload in sequence.

Worthington's by-pass control also reduces operating temperatures, eliminating valve difficulties from carbon deposits, improving lubrication, and reducing cylinder wear.

Other features include Worthington's famous Feather* Valve (lightest, tightest, most efficient ever made) . . . and a high-efficiency intercooler which needs less water, less power, less attention.

For more proof *there's more worth in Worthington*, write for Bulletin L-675-B1B to Worthington Pump and Machinery Corporation, Compressor Division, Buffalo 5, New York.

WORTHINGTON

*Reg. U. S. Pat. Off.

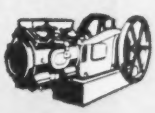
K.1.6

NO OTHER AIR COMPRESSOR WILL OUTPERFORM A WORTHINGTON

Y-TYPES

BALANCED ANGLE

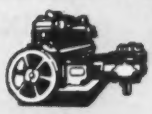
HORIZONTAL



PORTABLE

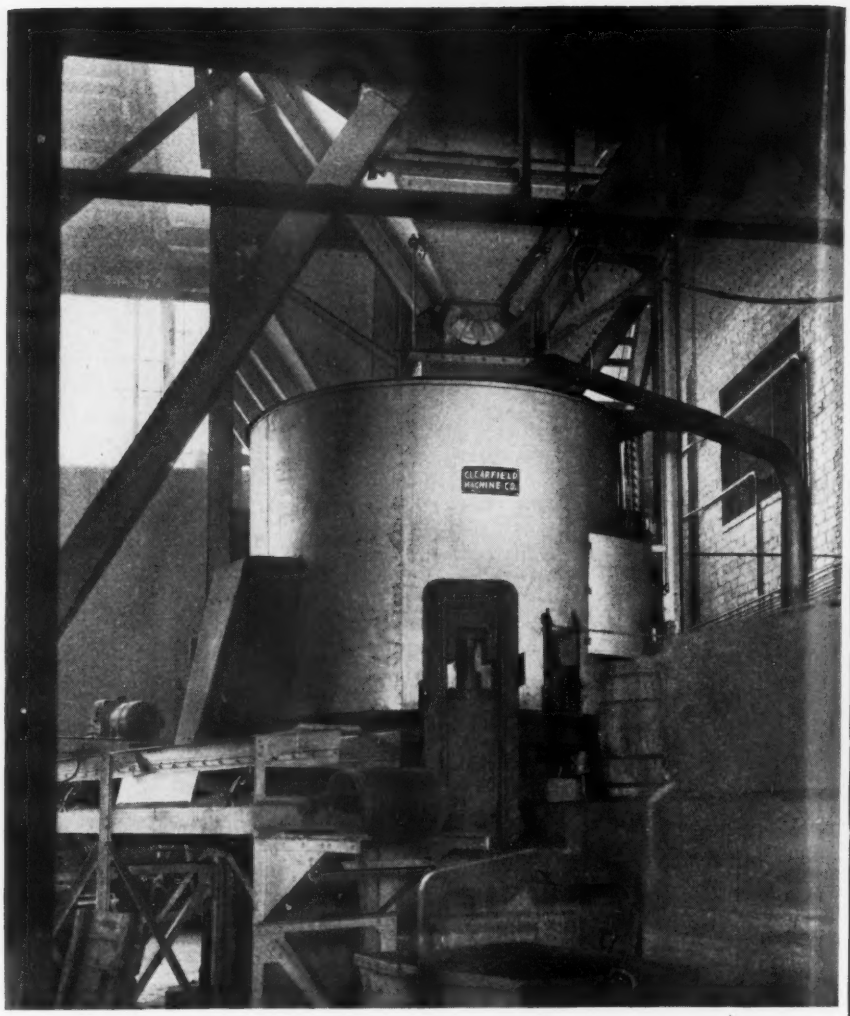
RADIAL

GAS ENGINE COMPRESSORS



you get
better
foundry sand
from a

CLEARFIELD
MIXER



This Clearfield 930 Mixer is the center of a complete molding sand conditioning system.

Sand which adheres firmly during both molding and pouring operations must have bond and moisture uniformly distributed. This is absolutely essential for good foundry work—and that's the type of sand which is turned out all the time by Clearfield Mixers

Clearfield Mixers, with the famous revolving pan and vertically rotating mullers, are available in sizes and models to fit in perfectly with any production setup. So whether your needs are for small quantities of sand at infrequent intervals or a continuous large supply, write for Catalog No. 79 for complete information on the Clearfield Mixer which you require.

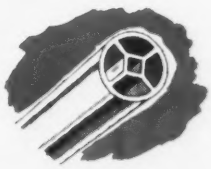
CLEARFIELD
MIXER

MIXES, TEMPERS
AERATES

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A

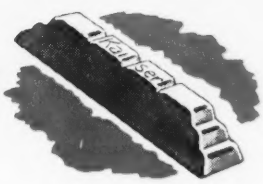
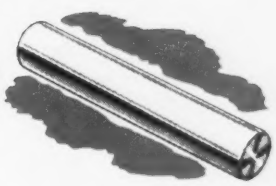
Engineering Assistance and technical

advice on any aluminum casting

or extrusion  problem is yours for the

asking to help you make better use of

Kaiser Aluminum pig, specification

ingot  or extrusion billets 

▶ Aluminum pig, specification ingot, extrusion billets. Sales offices in principal cities. Kaiser Aluminum & Chemical Sales, Inc., Oakland, California.

Kaiser Aluminum

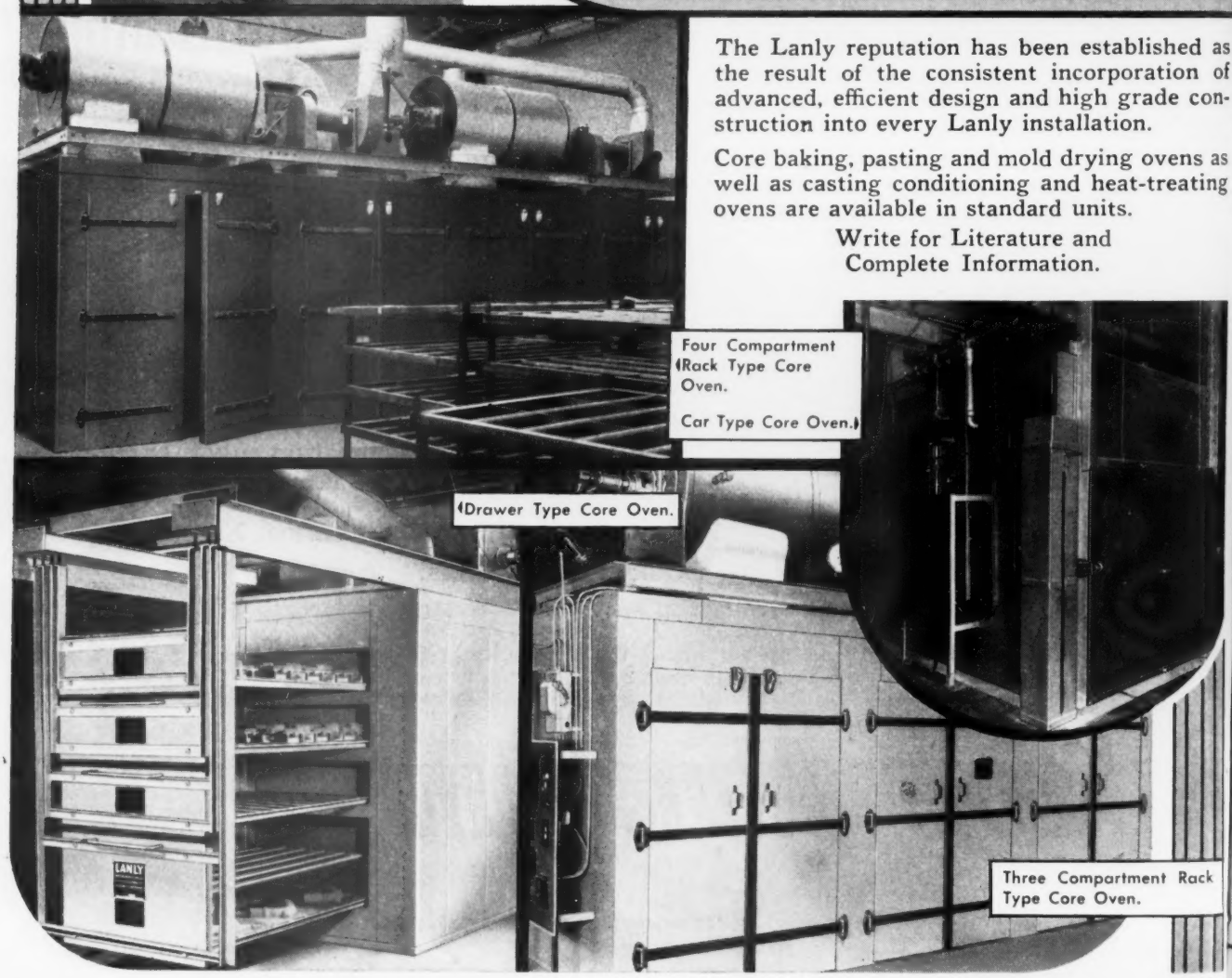
A major producer of aluminum pig, specification ingot and extrusion billets

Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.



In the Circle

OF LEADING FOUNDRIES, a highly praised and indispensable material for minimizing casting rejects, is—

Famous CORNELL CUPOLA FLUX

THE TIME-PROVEN METAL CLEANSER

The iron you pour is not thoroughly clean unless you are using the most efficient metal cleanser.

Wherever its achievements are known, Famous Cornell Cupola Flux is constantly selected for the job of conditioning iron for better castings. And the casting rejects averted, have saved many thousands of dollars over its cost.

It not only does a thorough job of cleansing molten iron but desulphurizes it, makes it more fluid, and keeps slag fluid.

It brings you sounder, cleaner castings, and improves machinability.

WRITE FOR BULLETIN NO. 46-B

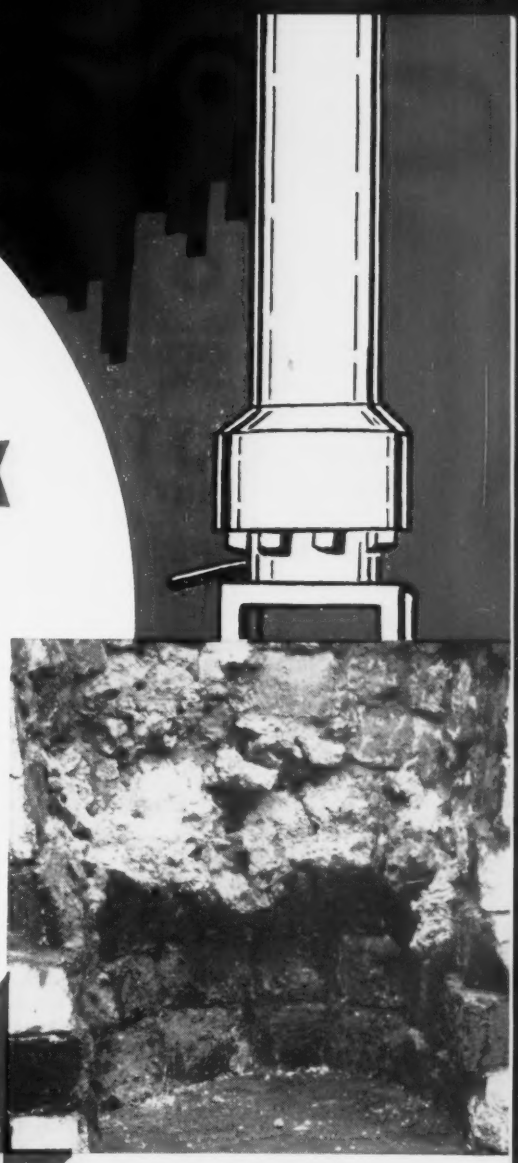
Pre-Measured

SCORED BRICK FORM

(Approx. 4 pound brick)

A most convenient form of flux. Permits greater accuracy in using. Prevents waste. You just lift it out of container and toss it into your cupola with each ton charge of iron, or break off one to three briquettes (quarter sections) for smaller charges, as per instructions.

THE CUPOLA where Famous Cornell Cupola Flux is used.



THE CUPOLA before using Famous Cornell Cupola Flux.

• • •

CUPOLAS ARE CLEANER

Down Time and Maintenance Cost is Greatly Reduced.

Bridging over is practically eliminated. Drops are cleaner.

And by forming a glazed or vitrified surface on brick or stone it reduces erosion of cupola lining, prolonging the period between patching and replacement.

•

Malleable foundries, with cupolas, are also obtaining the benefits enjoyed by the gray iron industry.

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes - Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass ever when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

CHROMIUM...key metal for strength, corrosion resistance, and heat resistance

Chromium is one of the most important alloying elements in iron and steel metallurgy since it markedly improves certain chemical and physical properties.

Increases Strength

The strength of steels is greatly increased by chromium because it retards the transformation of certain constituents during rapid cooling.

This makes it possible to obtain great depth of hardness in high-carbon steels, toughness in structural steel, and high strength and ductility in heavy sections. Chromium also increases resistance to shock by refining the grain of the steel.

Of all the alloying elements, chromium is probably the least expensive for increasing the tensile strength of steel. Additions of as little as 0.25 to 1.25 per cent chromium will increase the chill and hardness

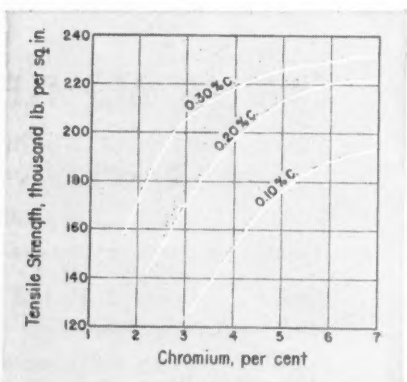


Fig. 1. Chromium increases the tensile strength of air-cooled steels of varying carbon content.

of the steel, as well as the tensile strength.

In copper, aluminum, and other non-ferrous alloys, chromium provides increased strength, also.

Imparts Corrosion Resistance

Commercially, chromium is added to steel and iron in amounts up to 30 per cent for the purpose of improving corrosion resistance.

In general, as the chromium content is increased with a given carbon content, the resistance of the steel to corrosive media becomes greater. The well-known "stainless" steels resist corrosion because substantial percentages (usually 12 per cent or more) of chromium are present.

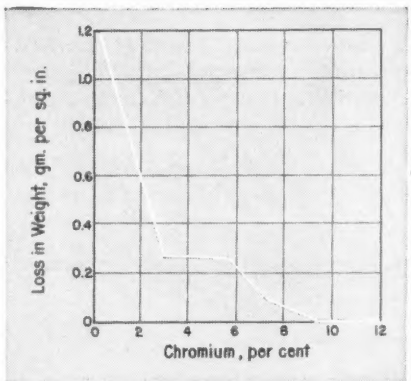


Fig. 2. Results of atmospheric corrosion tests on low-carbon steels of different chromium contents after 10 years of exposure to an industrial atmosphere.

Improves Heat Resistance

In both cast iron and steel, chromium provides good resistance to deterioration from heat. The use of chromium-alloyed iron and steel where high temperatures are encountered, for example, helps to prevent oxidation, which would ruin equipment. As little as 1 to 2 per cent chromium is added to cast iron to improve oxidation resistance and reduce growth of grate bars subject to high temperatures. Oxidation resistance improves progressively as the chromium is increased. Steels containing as little as 5 per cent chromium show good life at temperatures up to 1200 deg. F. For higher temperatures, appropriate steels of higher chromium content may be selected. Steels containing 25 to 28 per cent chromium give satisfactory service at temperatures up to 2100 deg. F.

Alloy cast irons with 15 to 30 per cent chromium are commonly used for applications requiring resistance to severe heat and abrasion.

In non-ferrous alloys, also, chromium is an important constituent for heat and corrosion resistance. It is used in the production of non-ferrous metal-cutting tools, chromium bronzes, and electrical resistance alloys.

Available Alloys

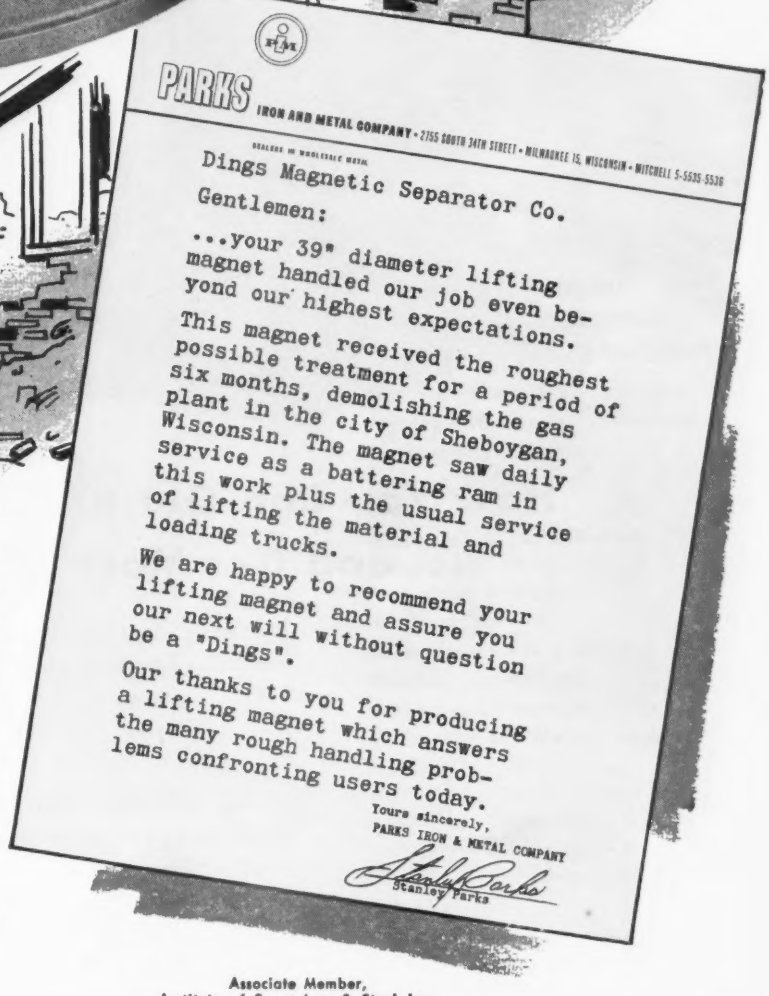
Chromium is produced by ELECTROMET in the forms listed below which are suitable for every use of the iron, steel, and non-ferrous metal industry.

"EM," "Electromet," and "SM" are trade-marks of Union Carbide and Carbon Corporation.

Alloys of Chromium and Their Uses

Low-Carbon Ferrochrome	For production of corrosion- and heat-resistant steels, commonly known as the "stainless steels," as well as special high-temperature alloys in which a low carbon content is desirable.
High-Carbon Ferrochrome	For production of chromium-bearing steels that do not require low percentages of carbon. Also used for adding chromium to cast iron.
Nitrogen-Bearing Ferrochrome	For reducing grain size and improving physical properties of high-chromium steels.
"EM" Ferrochrome-Silicon	Used in the production of stainless steels for adding chromium to the bath, and for reducing oxidized metals in the slag back into the bath.
"EM" Ferrosilicon-Chrome	Readily soluble material for making either furnace or ladle additions of chromium to steels.
"SM" Ferrochrome	Readily soluble material for making chromium additions to steel or cast iron in either the furnace or the ladle.
Foundry Ferrochrome	Especially for use in making readily soluble ladle additions of chromium to improve composition and properties of cast iron.
Chromium Metal	For use in non-ferrous chromium-bearing alloys, such as electrical resistance alloys, high-temperature and corrosion-resistant alloys, metal-cutting tools, chromium bronzes, and certain high-strength aluminum alloys.
"EM" Chromium Briquets	For adding chromium to cast iron in the cupola.

Shock Test proves Dings new Lifting Magnet CAN TAKE IT!



PARKS IRON AND METAL COMPANY • 2755 SOUTH 34TH STREET • MILWAUKEE 15, WISCONSIN • MITCHELL 5-5535-5536

Dings Magnetic Separator Co.

Gentlemen:

...your 39" diameter lifting magnet handled our job even beyond our highest expectations.

This magnet received the roughest possible treatment for a period of six months, demolishing the gas plant in the city of Sheboygan, Wisconsin. The magnet saw daily service as a battering ram in this work plus the usual service of lifting the material and loading trucks.

We are happy to recommend your lifting magnet and assure you our next will without question be a "Dings".

Our thanks to you for producing a lifting magnet which answers the many rough handling problems confronting users today.

Yours sincerely,
PARKS IRON & METAL COMPANY
Stanley Parks

"ROUGHEST possible treatment for 6 months," says Parks Iron & Metal (right).... Users have been impressed with the way the Dings all-welded lifting magnet hoists a full load *all* day right up to quitting time. THAT'S BECAUSE it's cooler operating. NOW some really rugged assignments like the one at right have proven this magnet is thick skinned as well as muscled. Yet it's light. THAT'S BECAUSE the magnet is heavily reinforced *where it counts.*

Here, then, is a testimonial that any handler of metals can translate into his own profit story. Let your nearest Dings Representative give you details. Or write for the new lifting magnet bulletin —today,

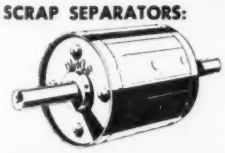
DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave., Milwaukee 46, Wisconsin

Deliveries Are Still Good!

Associate Member,
Institute of Scrap Iron & Steel Inc.

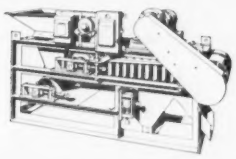
DINGS MAGNETS

SCRAP SEPARATORS:

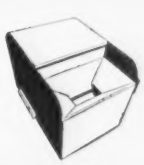


Non-Electric Drums

Electric and Non-Electric Pulleys



Type BN



Type MA

How You Can Get Brass Ingot ...and Get More Out of What You Get

It's simple. Just turn in scrap. The more scrap smelted, the more brass ingot available. The more available, the more you get.

Even so, you may not get all you want, or exactly the alloy you want all the time. Therefore, Federated offers you an extra service to get more out of what you do get.

That help comes from the Federated salesman . . . a man whose job it is to speak for you at the source of supply. He is close to production, to research, to field metallurgical experts . . . and to *you*. His job is to satisfy you . . . with the alloy you want when you want it. Today that is often impossible. But even *today* the Federated salesman is frequently able to make your job easier by recommending alternate alloys that are available.

Remember your Federated salesman. He's your representative at non-ferrous metals headquarters.

Federated Metals Division

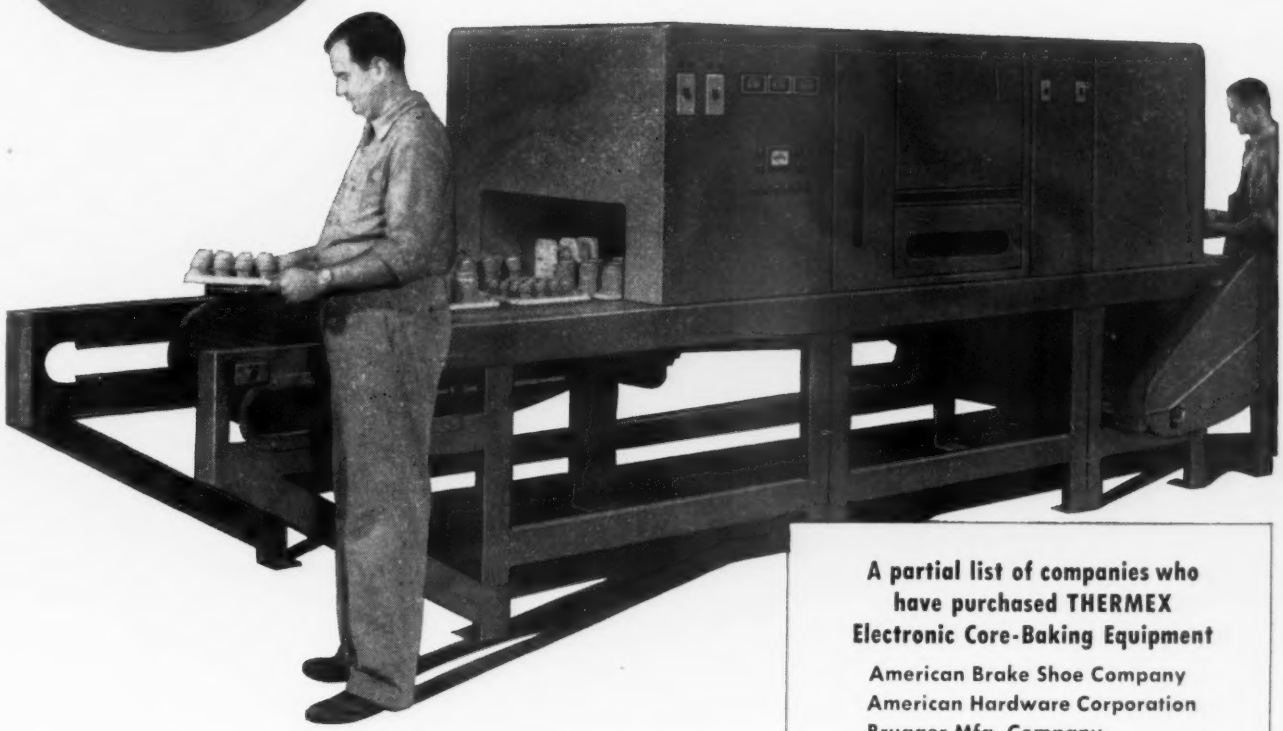
Federated first in the non ferrous field AMD

AMERICAN SMELTING AND REFINING COMPANY · 120 BROADWAY, NEW YORK 5, N. Y.

Thermex

ELECTRONIC CORE-BAKING EQUIPMENT

"Pays for itself in less than a year"



FOUNDRIES are making spectacular savings with THERMEX Core-baking Equipment—often report that this labor-saving equipment pays for itself in less than a year.

For instance, one company* which replaced conventional drying ovens with two THERMEX Core-baking Units is making a saving of 27.8% for each 1,000 pounds of finished cores. Based on the foundry's total production, *savings amount to $28,970* per year.

Why not take advantage now of this cost- cutting equipment? A THERMEX field engineer will be glad to show you engineering economy studies, based on verified installations like this, which give complete cost data. Write The Girdler Corporation, Thermex Division, Louisville 1, Ky.

See how Thermex can cut your costs!

Name on request

A partial list of companies who have purchased THERMEX Electronic Core-Baking Equipment

- American Brake Shoe Company
- American Hardware Corporation
- Brugger Mfg. Company
- James B. Clow & Sons
- Crane Company
- Drake Non-Clinking Furnace Block Co., Inc.
- Ford Motor Company
- Fundicao Tupy
- Grand Haven Brass Foundry
- Grinnell Corporation
- International Harvester Co., Ltd.
- Moline Malleable Iron Company
- Mueller Company
- National Malleable & Steel Castings Company
- Ontario Malleable Iron Co., Ltd.
- Phoenix Brass Fittings Corp.
- Ronci Co., Inc.
- Sterling-Faucet Company
- U. S. Pipe & Foundry Company
- Walworth Company

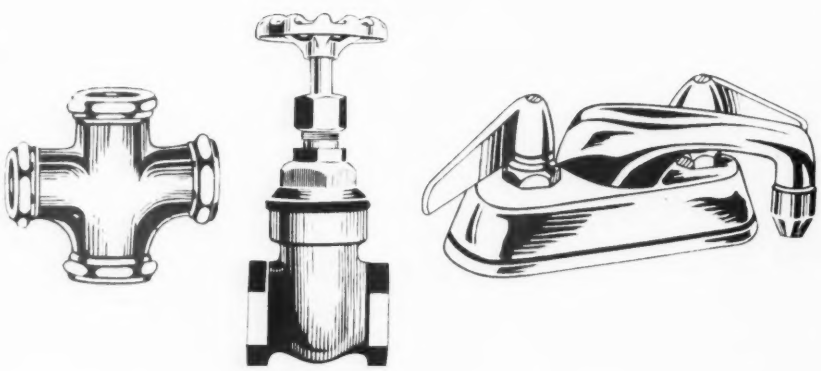
THERMEX-T. M. Reg. U. S. Pat. Off.

The GIRDLER Corporation

THERMEX DIVISION

Why *Brass* can better serve your needs

Beauty and **ENDURANCE**



PLUMBING ENGINEERS ADVOCATE BRASS CASTINGS FOR CORROSION RESISTING QUALITIES . . . .

Brass castings possess good machining qualities, which result in a four-fold combination of preferred properties. Economy . . . beauty . . . corrosion resistance and machinability. These factors are essential in the production of quality plumbing products.

FREE . . . Write for your copy of the 8-page Lavingot Technical Journal — Vol. 8, No. 1 — containing an article discussing "Effects of Various Elements in Manganese Bronze."

Specify—**LAVIN NONFERROUS INGOT**—*Quality*

Brass · Aluminum · Bronze · Zinc Base Die Casting Alloys

R. LAVIN & SONS, INC.

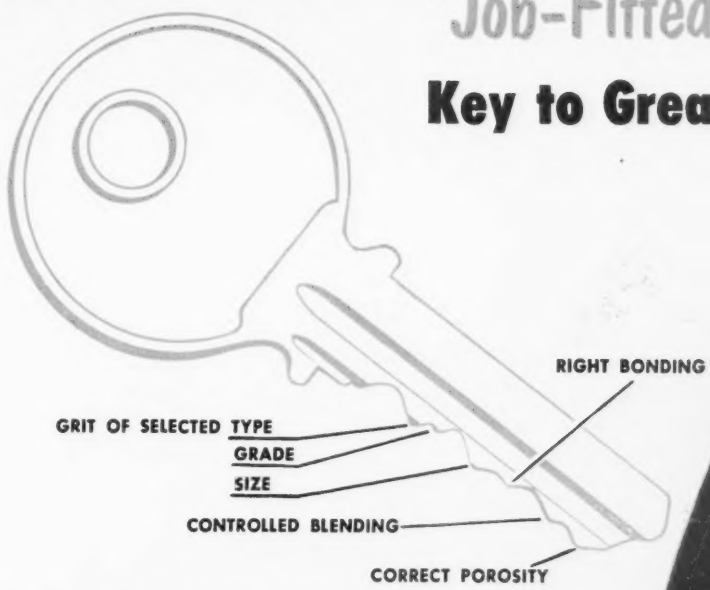
- *Refiners of Brass, Bronze and Aluminum*
- *Producers of Zinc Base Die Casting Alloys*

3426 S. KEDZIE AVENUE • CHICAGO 23, ILLINOIS

REPRESENTATIVES IN PRINCIPAL CITIES

R. LAVIN & SONS INC. 1900 52 Years 1952 SERVING THE FOUNDRY INDUSTRY

WHY BESLY-TITAN "Job-Fitted" WHEELS are the Key to Greater Grinding Efficiency



Here's the master key to top efficiency in grinding operations: *Besly-Titan is set up to supply the right wheel for each job,* as you need it, when you want it, at no higher cost than stock wheels!

As the tumblers in a lock yield to just one key, only one set of specifications in the grinding wheel will get *best* results on a casting, with its own set of unique qualities. It is the differences in iron or alloy, the size and shape of casting, quantity of stock removed, type of grinder, results wanted from grinding, etc., that prevent one "key" from fitting job after job. Changed specifications in the work call for changed specifications in the wheel used.

This is why the "job-fitting" service you get with Besly-Titan Abrasive Wheels and Discs makes them the outstanding buy for foundries.

Besly-Titan is organized to diagnose your needs, prescribe the wheel that will perform best on a given job, and supply you on a few-days-delivery schedule. Use the coupon below, or write, to secure all details on formula recommendations and Trial Order Plan.

BESLY-WELLES CORPORATION

(Established as Charles H. Besly & Co. in 1875)

20 No. Wacker Drive • Chicago 6, Illinois

Representatives in principal cities

BESLY-TITAN

BESLY-WELLES CORP., Dept. F, 20 No. Wacker Dr., Chicago 6, Ill.
(Established as Charles H. Besly & Co. in 1875)

☐ Please send details of Besly-Titan "Job-Fitted" Wheel Service.

☐ Also tell about Trial Order Plan.

*Name*_____

*Foundry*_____

*Address*_____

*City*_____ *Zone*___ *State*_____

9 from 3!

NINE TONS OF HIGH QUALITY IRON PER SHIFT FROM THESE 3 DETROIT ROCKING ELECTRIC FURNACES

Vassar Electroloy Products Company has based its growth on precisely controlled, quality iron and steel castings. In five years, metal melting requirements have increased more than 700%.

Today, three 700-lb. Detroit Rocking Electric Furnaces keep the pouring ladles full, producing alloys with exact metallurgical and physical characteristics melt after melt. The fast, efficient operation of these furnaces maintains high production levels and high standards of economy.

For melting ferrous or non-ferrous metals, these indirect arc furnaces have many advantages; easy, positive control; uniformity of melts; thorough mixture of elements through the melts; optimum use of power; less metal shrinkage; more heats per day; easy shell replacement.

Furnaces are available in 10 to 4,000 lbs. capacity, designed specifically to fit your electrical specifications. Get full information. Write today!

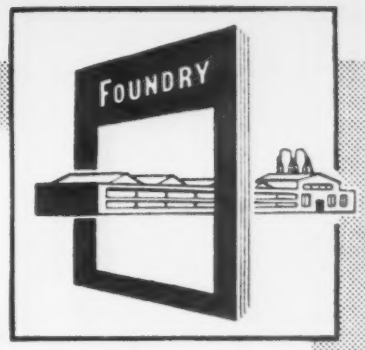
in operation AT ATLANTIC CITY MAY 1-8

See this Detroit furnace in operation at our booth at the Foundry Show. It will be melting alloy iron used in an interesting shell molding demonstration by The Borden Co.

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.



Dear Reader:

This page has been provided for your convenience. Use one of the return cards below for more information on advertisements in this issue of **FOUNDRY**.

Write the name of the advertiser and the page number of the ad in the spaces provided. Check the type of information you want. After you have finished going through this issue of FOUNDRY and have jotted down all of the ads on which you'd like more information, just tear out the card, drop it in the mail. We'll do the rest.

Our staff will forward this information to the advertiser immediately so you'll be relieved of the necessity of writing several letters. You'll hear from the advertiser directly, answering your request.

FOUNDRY
Readers Service

FIRST CLASS
PERMIT No. 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio
Readers Service Dept.

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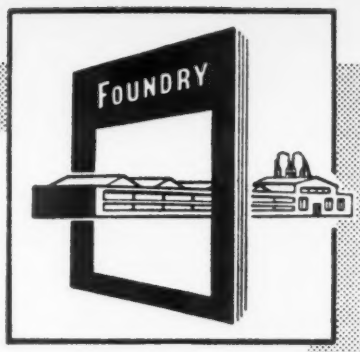
COMPANY _____

ADDRESS _____

CITY _____ STATE _____

FDY 4-52



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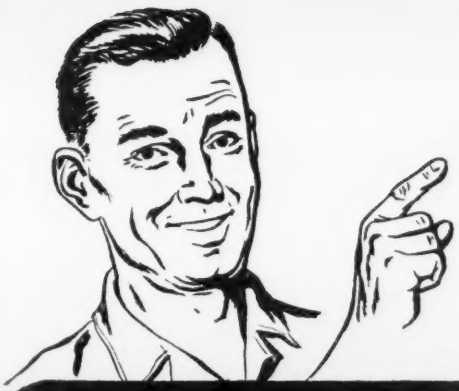
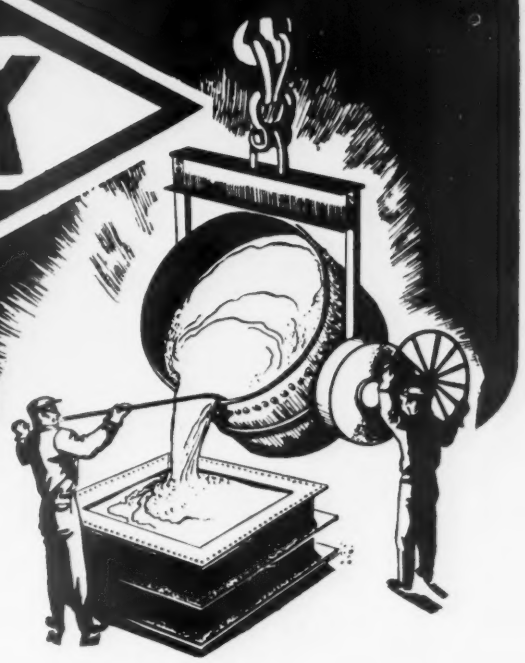


Uniformity!

METALLURGICAL CONTROL IN MANUFACTURE ASSURES UNIFORMITY OF CASTFLUX— THE 'NATIONAL' DUAL-PURPOSE FLUX

CASTFLUX

Trade Mark Reg.



CASTFLUX SB-10,

the anti-piping compound, has been universally accepted by the industry for its metallurgically controlled "batch-uniformity". The reputation for uniformity has been so well established that it is standard usage in foundries and steel mills the world over . . . as a ladle addition to clean, heat and liquefy molten metal . . . to effect a 10% to 30% saving in "remelt" riser or hot top metal through "short" pouring . . . on blind and open risers to keep metal hot and liquid for periods of 100% to 200% longer. Virtually produces no smoke or fume. That it increases the yield and improves production at considerable savings has been conclusively proven. You, too, can benefit by a test-trial!

Unconditionally GUARANTEED

Risk no money! Unless CASTFLUX SB-10 meets with your full approval, trial order can be returned at no expense within 30 days.

We'll be seeing all our old and many new friends

May 1st thru 7th

at the

INTERNATIONAL FOUNDRY CONGRESS & EXHIBIT — CONVENTION HALL ATLANTIC CITY, N. J.

Booth No. 214

NATIONAL pigment co.

NATIONAL PIGMENT CO., 2115 E. YORK ST. PHILA. 25, PA.

☐ Send me your literature "The Story of Castflux"

☐ Send me a trial order of CASTFLUX SB-10

Name .....

Foundry .....

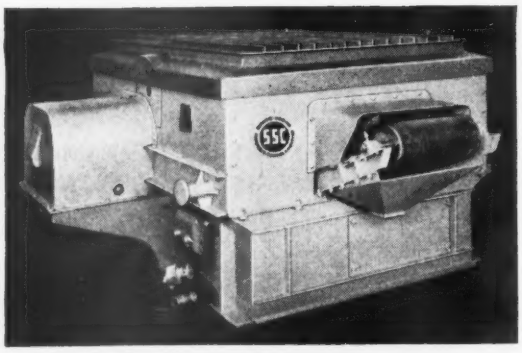
Address .....

City ..... Zone ..... State .....

2115-2117 EAST YORK STREET, PHILADELPHIA 25, PA.

HEWITT-ROBINS

DESIGNED FOR FOUNDRY SAVINGS



Hewitt-Robins SSC® Unit

5 Foundry Operations with 1 Piece of Equipment

Saves Time: This one compact, self-contained unit takes care of your entire shakeout and sand removal in a single operation.

Saves Space: Requires no more space than the average-size shakeout, yet it serves 5 complete foundry functions . . . flask shakeout—sand screening—lump breaking—conveyor feeding—tramp-metal trapping!

Saves Money: In one jobbing foundry, where it normally took 8 men a total of 7 hours to completely shakeout molds and reclaim sand, the entire foundry floor was cleaned up in just 3 hours by only 3 men and an SSC Unit.

Saves Trouble: Entirely automatic . . . the Hewitt-Robins SSC Unit needs no attention . . . just put the flask on the shakeout deck—turn on the power and the material flows smoothly from sequence to sequence until the Feeder Belt Conveyor discharges the sand.

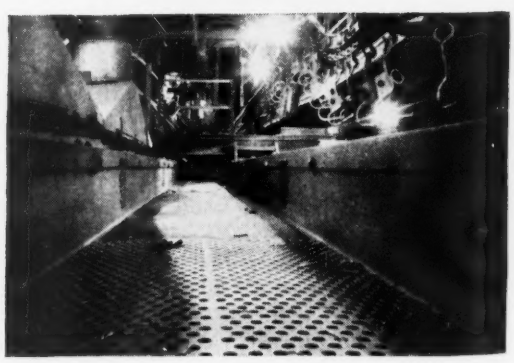
For complete details about the Hewitt-Robins SSC Unit, write for Bulletin No. 136.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

FOR TOUGH MATERIALS HANDLING JOBS

Hewitt-Robins Vibra-Veyor®

Handles Anything a Belt Conveyor Can't



Faster: The Vibra-Veyor moves a full pan load of material . . . hot or cold, wet or dry, lump or pulverized . . . quickly, quietly . . . on the horizontal—downhill—uphill to 10°.

More Efficient: Won't bog down even when loaded to the top of the pan—takes multiple feeds—starts under full load—has feeder action—spreads surges.

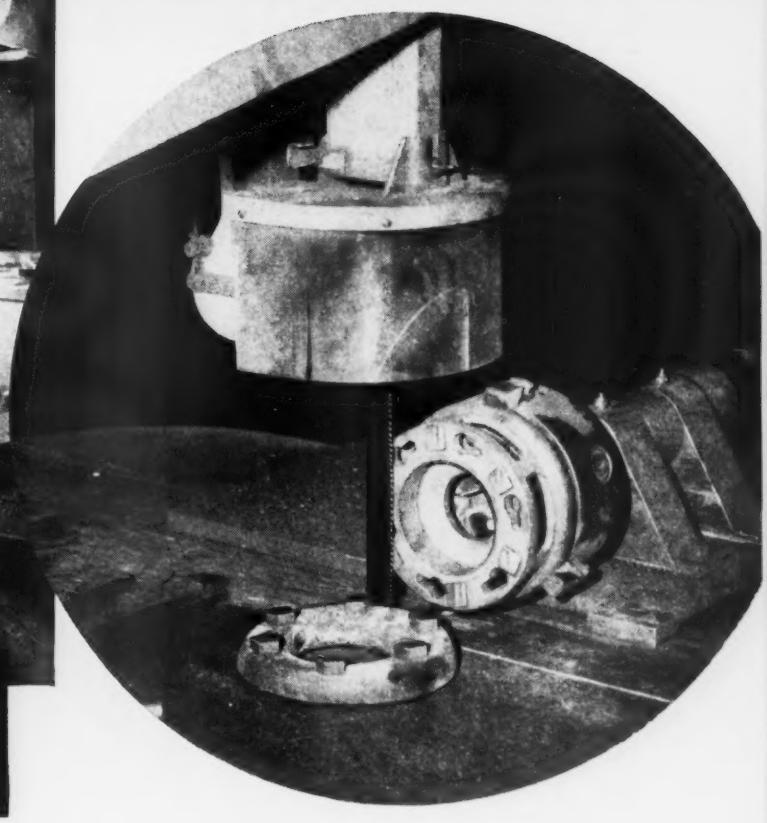
Easier To Install—Maintain: The Vibra-Veyor requires no heavy foundation because vibration in the base structure is kept to a minimum—needs lubrication at only 4 points.

For complete facts, write for Bulletin 135

HEWITT-ROBINS HR INCORPORATED

Stamford, Conn.

DoALL FRICTION SAWING TRIMS 6 GATES IN *FRACTION* of a *MINUTE*



FRICTION SAWING WITH A DoALL ZEPHYR PROVES FASTER, CLEANER THAN ANY OTHER METHOD

ALLOY PRECISION CASTINGS CO., Cleveland, had to find a quick and easy way to trim gates from stainless steel generator brackets. After consideration of various methods of handling this job, DoALL *friction sawing* was found to be by far the fastest and most economical way to meet the production requirements. They cut all six gates in a fraction of a minute with a DoALL Zephyr band machine and friction saw band. The job was done to a finer finish than possible with other methods, thereby saving time on further cleaning operations.

DoALL friction sawing (heat concentration to soften the metal ahead of the saw band) cuts all ferrous metals up to 1" thick. Cuts are made at speeds of 10,000 to 15,000 F.P.M. The DoALL friction saw band used gives you an accurate cut — gives finer finishes — reduces subsequent grinding. Ask for a FREE demonstration in your foundry. Call your local DoALL Sales-Service Store or write:

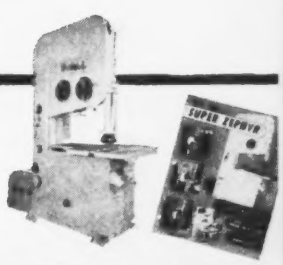
The DoALL Company
254 N. Laurel Ave., Des Plaines, Illinois

DoALL Friction Saw Bands Available Now From Local Stock

New DoALL friction saw bands have the teeth *locked in* by a special heat process giving you longer band life at lower cost. You can buy DoALL friction saw bands in 500 ft. coils or specially cut and welded lengths to fit your machine.

SEE THIS EQUIPMENT AT THE FOUNDRY SHOW ATLANTIC CITY, MAY 1-7

WRITE FOR BULLETINS



DoALL SB-9

Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies

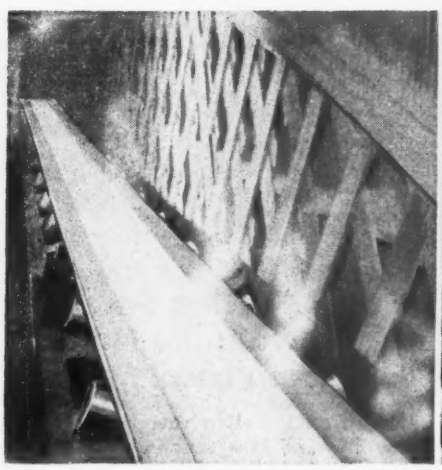
REPUBLIC
HOT MATERIAL conveyor belting

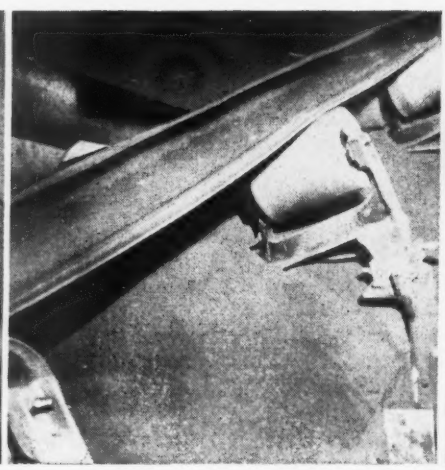
Put your hot cargoes on Republic Hot Material Conveyor Belts! That's the sure way to end costly breakdowns and maintenance bills resulting from high temperature exposure.

Republic Hot Material Conveyor Belts are made with special carcass fabrics imbedded in and covered with insulating rubber, specially compounded for resistance to heat, cutting and abrasion. Chances are there's a special Republic Hot Material Conveyor Belt already built for your specific job requirements. If not, 52 years of product development experience are at your service.

Your local Republic Distributor can help you decide whether you need duck, asbestos or glass ply construction. Contact him today or write today for full facts.

hot material handling without breakdowns!!





At the Carbon Limestone Company, Hillsville, Pennsylvania, pulverized limestone leaves a series of crushers, screens and heat dryers and drops stinging hot upon this Republic Rubber-Glass Belt. The work is continuous. But despite temperatures that exceed 300°F., up to 80 tons of material are handled during a single hour without harm to the belt.

This Republic Rubber-Glass Conveyer Belt carries tons of smoldering sand for one of the world's biggest foundries. Temperature of the sand runs as high as 400°F. Mixed within the sand as it travels from shakeout racks to reclaiming stations are red-hot pieces of jagged metal. Despite the difficult work conditions, this Republic Rubber-Glass Conveyor Belt is giving ten times more service than the belt it replaced!

International Minerals & Chemical Corporation uses Republic Super Excelo Hot Material Belting to carry hot potassium salts through their Carlsbad, New Mexico, plant. The belt operates 20 hours per day. The load runs an average 325°F. temperature, yet the belt's performance record is considered to be "excellent."

Sure way to Beat the Heat!!

INDUSTRIAL RUBBER PRODUCTS BY
REPUBLIC RUBBER DIVISION
Lee Rubber & Tire Corporation
YOUNGSTOWN, OHIO

Carries 400 cu. ft. of sand—rams up to 27 cu. ft. a minute... *with help of TIMKEN® bearings*

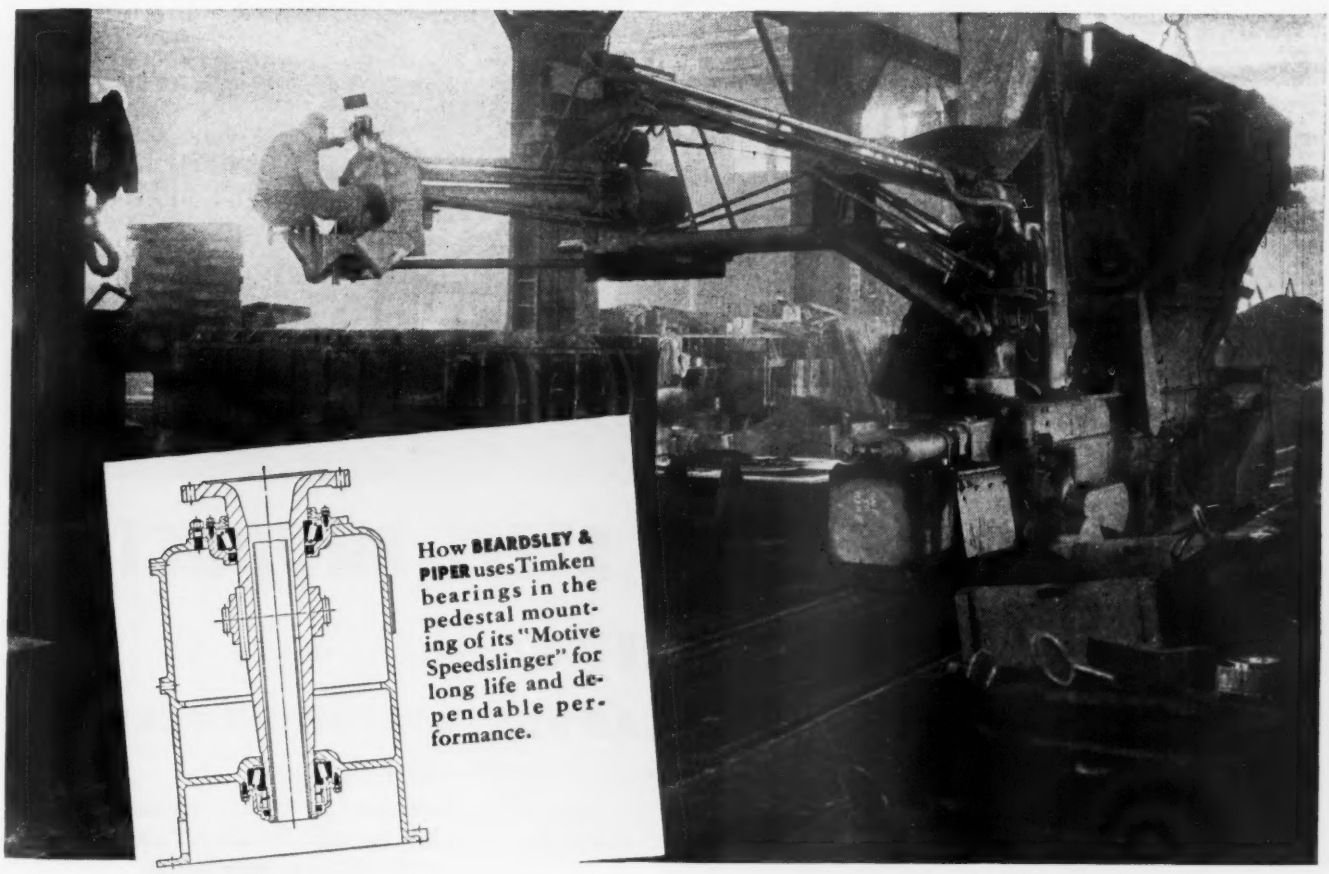
THE Beardsley & Piper "Motive Speedslinger" carries its own sand in a 400 cu. ft. tank and can ram it into molds of any size at a maximum rate of 27 cu. ft. per minute. It reportedly has the largest capacity and greatest range of operation of any mechanized molding device. And with Timken® tapered roller bearings in the wheels and pedestal mounting of the ramming pivot, foundries are assured of long, trouble-free performance.

Line contact between the rollers and races of Timken bearings provides extra load-carrying capacity. And because of their tapered construction Timken bearings take both radial and thrust loads in any combination. That's why they can handle the heavy overhung load of the ramming apparatus.

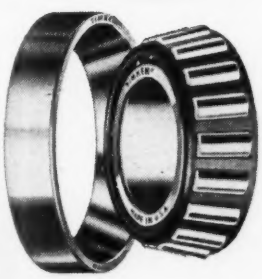
Since Timken bearings hold shaft and housing concentric, closures are more effective—keeping foundry dust out, lubricant in. The rollers and races of Timken bearings are case-carburized to provide hard surfaces and tough cores. That means extra resistance to wear and shock. Timken bearings are precision manufactured and since they're made of the finest steel ever developed for bearings—Timken fine alloy steel—they normally last the life of the machine.

No other bearing can give you *all* the advantages you get with Timken bearings. Make sure they're included in the foundry machinery you build or buy. Always look for the trademark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

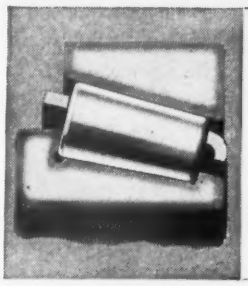


How **BEARDSLEY & PIPER** uses Timken bearings in the pedestal mounting of its "Motive Speedslinger" for long life and dependable performance.



TIMKEN

TAPERED ROLLER BEARINGS



GREATER LOAD AREA

Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ▯ AND THRUST ⊣▯⊢ LOADS OR ANY COMBINATION ⊣◎⊢

Accelerating heat input, lowering melt time, has become standard practice since the Mid-Continent Steel Casting Corp., Shreveport, La., has adopted the Airco-pioneered Decarb Process for steel production.

How TO INCREASE STEEL PRODUCTION

use less power–save more time

WITH AIRCO'S STEEL DECARBURIZATION PROCESS

Oxygen injected under the slag cover at 80 psi has become the answer to Mid-Continent's faster steel production.

Increased bath temperature—faster carbon elimination—lower power consumption . . . time saved per heat . . . gives Mid-Continent a product with the same normal chemistry, slag control and fluidity as they formerly received using ore. Additional workflow advantages are gained by the elimination of ore handling and storage problems.

Oxygen decarburization for faster heats may be put to work for you. The facilities of our Technical Sales Division may furnish you with the answers you need to know about this process for your use. If you are interested in obtaining further information, please address your nearest Airco office.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND

AN AIR REDUCTION PRODUCT

AIRCO®

DEALERS AND OFFICES IN PRINCIPAL CITIES

AIR REDUCTION

AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY • AIR REDUCTION PACIFIC COMPANY

REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL

DIVISIONS OF AIR REDUCTION COMPANY, INCORPORATED

Call for Republic's Pig Iron Metallurgist

He may not be an expert with a fly line, but the Republic Pig Iron Metallurgist can untangle in a hurry most of the problems which occasionally snarl up foundry operations.

He's a combination of trained metallurgist and practical foundryman—backed by years of actual foundry experience. When iron doesn't behave properly, he knows whether it's the fault of the mix or the way it's being handled. And he's not timid when it comes to giving you his frank and honest opinion —*in confidence.*

Hundreds of foundries — large and small —have found that it pays to call for the Republic Pig Iron Metallurgist whenever a tough problem slows down production. Why not do the same, next time trouble strikes your casting line?

Without cost or obligation in any way, Republic—*exclusive* producer of premium CHATEAUGAY Pig Iron—offers you the services of the Republic Pig Iron Metallurgist. Write, wire or phone whenever you want his assistance.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Dept.: Chrysler Building, New York 17, New York

Republic PIG IRON

"CHATEAUGAY" Low-Phosphorus, Copper-Free

"REPUBLIC" (Northern) Foundry, Basic and Malleable

"PIONEER" (Southern) Foundry and Basic

REPUBLIC STEEL

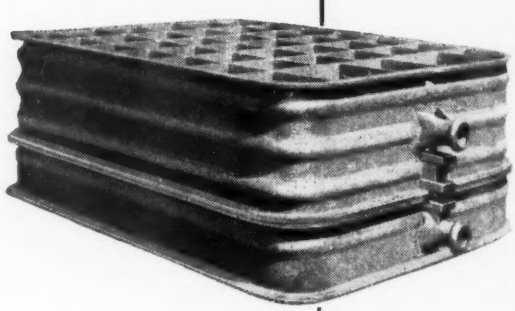
Model OM-4

Flasks of this type are especially adapted for fast production machine molding and steel used in their construction is of suitable gauge to meet specific requirements. Equipped with "D" type handles, welded or riveted, and single bearing welded pin lugs. Malleable riveted pin lugs are furnished when requested.

Model TM-10

Truscon medium weight flasks for two-man handling are manufactured in various sizes and gauges of steel to meet requirements. Model TM-10 flask is equipped with single bearing welded pin lugs. The end welded two-man handles provide for easy handling of units.

ABILITY to carry the load



Model CH-40

This is an extremely large flask for extra heavy duty. It has an intricate barring arrangement and illustrates double bearing welded pin lugs on cope and single bearing welded pin lugs on drag. Extra heavy duty trunnions are securely welded to flask.

Every Truscon Steel Flask is built with great strength and rigidity to withstand heavy day-after-day punishment in foundry service. The ribs and flanges extend full depth around the entire flask without buckling or cutting away the metal.

Every Truscon cope, drag and check is one integral piece of steel. There are no built-up sections that jar loose. The proper thickness of steel is used in every flask wall. Every detail of manufacture is given close attention in the efficient Truscon metal fabricating plant, which has many years of experience in flask production.

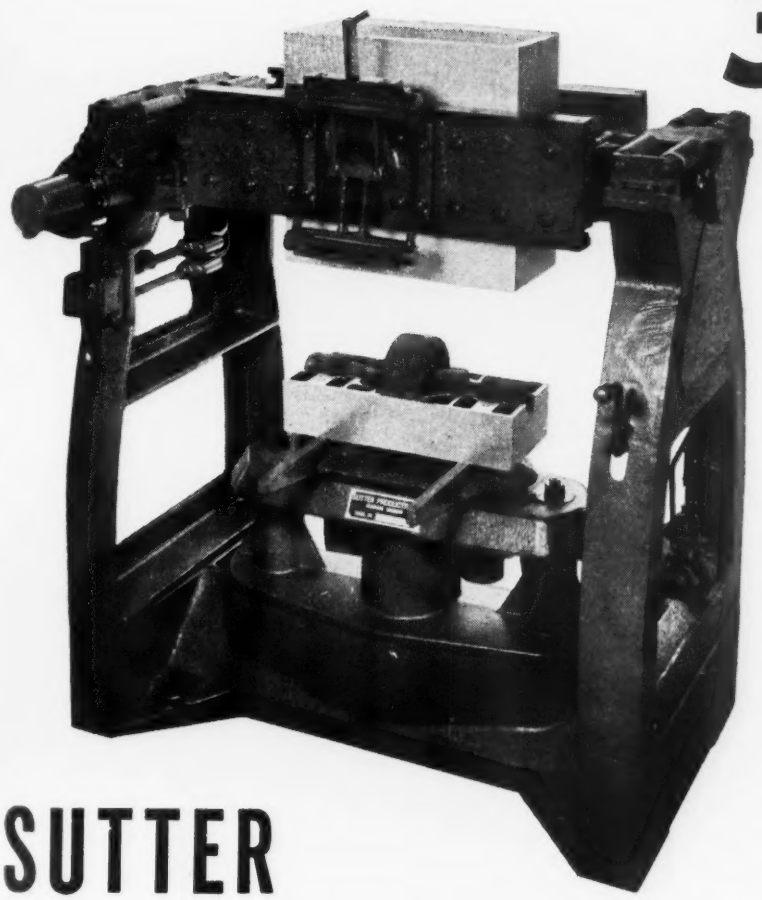
Write for illustrated literature describing the Truscon Steel Flask line available.

TRUSCON
MARK OF MERIT
PRODUCTS

TRUSCON® STEEL COMPANY PRESSED STEEL DIVISION

6208 Truscon Avenue, Cleveland 4, Ohio • *Subsidiary of Republic Steel Corporation*

See how you can boost Core Output 300%



Visit Booth 1350

FOUNDRY SHOW

ATLANTIC CITY

SUTTER

AUTOMATIC CORE DRAW MACHINE
with POWER ROLLOVER

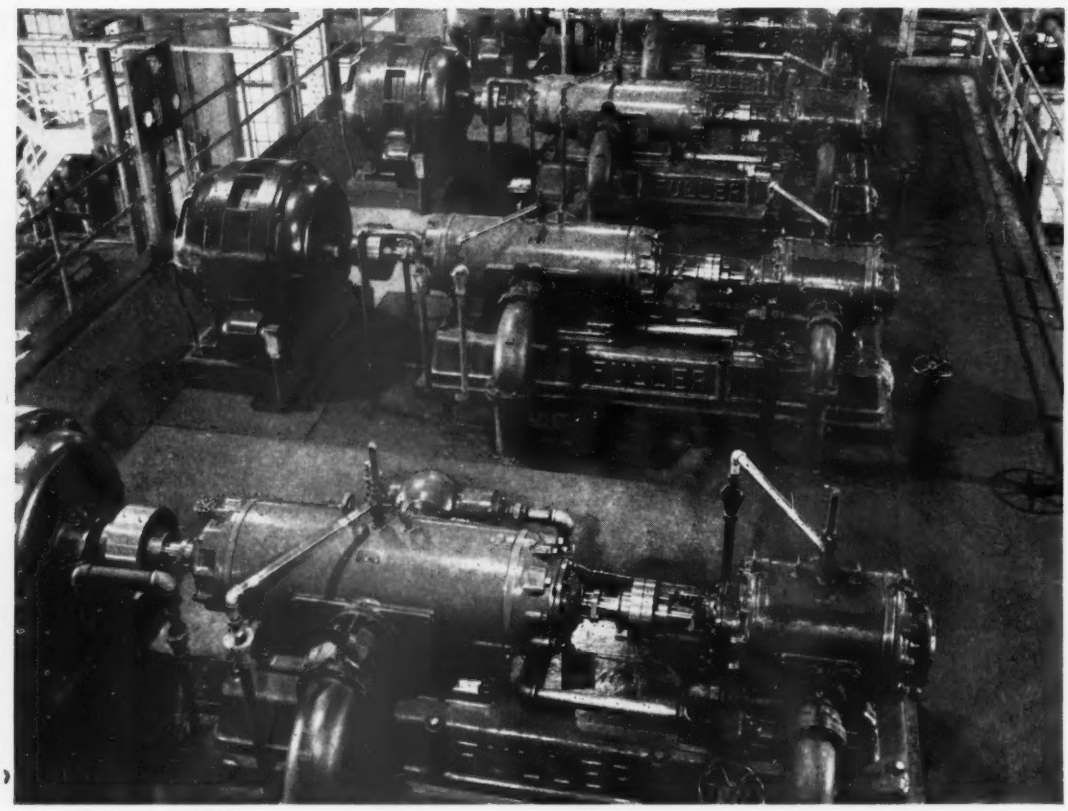
After clamping the dryer, push the start button and six seconds later a drawn core rests on the draw table . . . it's that simple with the Sutter Core Draw Machine. This rapid, completely automatic cycle speeds up production from 300% to 400% and also frees the operator to blow another core while one is being drawn. Further, because every core is drawn uniformly, even unskilled operators can maintain peak production of the most complicated cores with minimum rejects.

The Sutter Automatic Core Draw Machine will be operating at the Foundry Show in Booth 1350. Be sure to look in and find out how it can boost production and cut core costs in *your* plant. If you can't get to the show, send for Bulletin "F" which gives the whole story.

See SUTTER SHELL MOLDING MACHINE in operation at Booth 1839

SUTTER PRODUCTS COMPANY

2005 WESTWOOD AVENUE • DEARBORN, MICH.



Four two-stage rotary compressors installed in a steel processing plant. Capacity each 1665 c.f.m., 100-lb. pressure.

WHEN WE SAY "A FULL LIFETIME OF NEW MACHINE EFFICIENCY" WE MEAN IT! FULLER ROTARY COMPRESSORS

Fuller has been building rotary compressors for industry for many years. In that time Fuller Compressors have earned a solid reputation for complete dependability under all operating conditions and in all sorts and kinds of locations.

That's because Fuller Compressors are engineered to have a full lifetime of new machine efficiency and reliability. They have a minimum of moving parts—rotor, bearings, and blades. Blades automatically compensate for wear—there are no valves to leak or seats to grind—no need for frequent inspection and servicing.

That's why Fuller Rotary Compressors are ideal units to use in out of the way or isolated locations. You can spot them where you need them—and always be sure they'll be on the job, tirelessly and dependably.

If you're interested in more efficient and economical operation, we suggest you get in touch with a Fuller engineer. And for your files, why not write for Bulletin C-5, which describes and illustrates Fuller Rotary Compressors in detail?

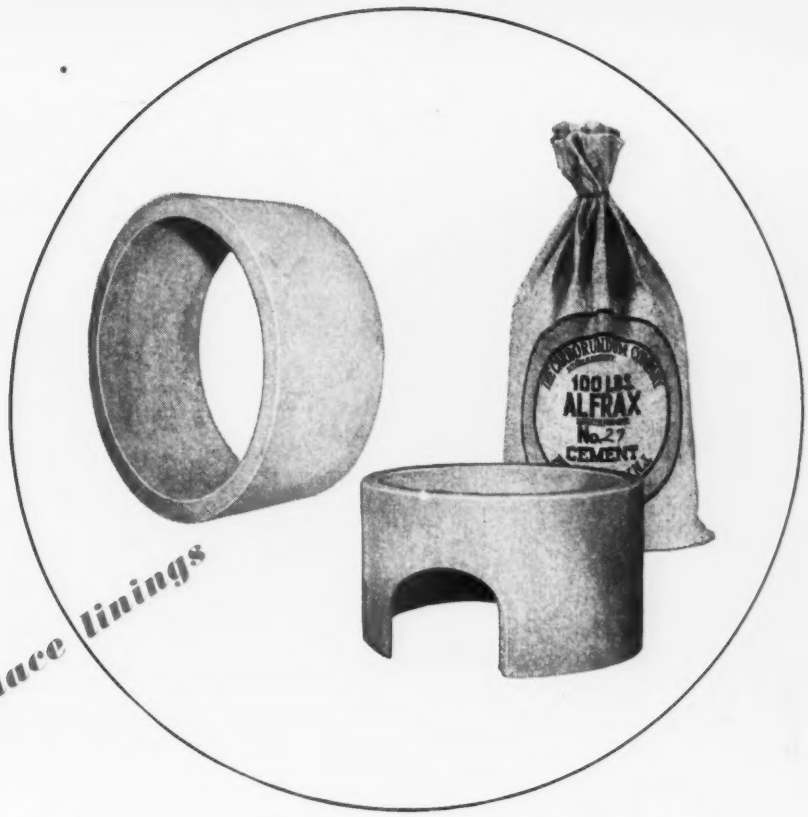
FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

Pressures to 125 psig.
Capacities to 3300 cfm.

fuller

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS
COMPRESSORS AND VACUUM PUMPS
FEEDERS AND ASSOCIATED EQUIPMENT

C-199



a straight line to better furnace linings

a ring/cement lining with 4 big advantages

Here's a lining for non-ferrous melting furnaces worth knowing about. It consists of one-piece CARBOFRAX silicon carbide rings, 1½" thick, backed up with 2½" or more of ALFRAX aluminum oxide insulating cement. Operators write that it . . .

GOES IN FASTER. Rings are light enough for one man to handle. No hoist is needed. The cement is handled like Portland cement — just mix with water and pour. A full lining can be installed in a couple of hours over a week-end, and be ready to go Monday.

STAYS IN SHAPE LONGER. CARBOFRAX rings make one of the most durable linings known. They are inherently resistant to flame erosion, spalling and cracking, and will go many months with little or no patching. Even really high temperatures won't soften them.

CUTS FUEL COSTS. Since the rings are only 1½" thick, there's ample space left for insulation. Moreover, the ALFRAX cement that backs up the rings is one of the best refractory insulating materials available. It provides a low heat capacity furnace and keeps heat loss to a minimum — hence less fuel is needed to turn out more melts.

GIVES EXTRA HEATS. You'll get fast, uniform heating with these linings, and *consistent* time per heat. One extra heat per day, sometimes two, is quite possible.

Why not check up? It takes just a moment to drop us a line. We'll gladly furnish recommendations to fit your needs. We make lining materials — rings, ring segments, and cements — to fit *every* need. Address Dept. A-42, Refractories Division, The Carborundum Co., Perth Amboy, N. J.

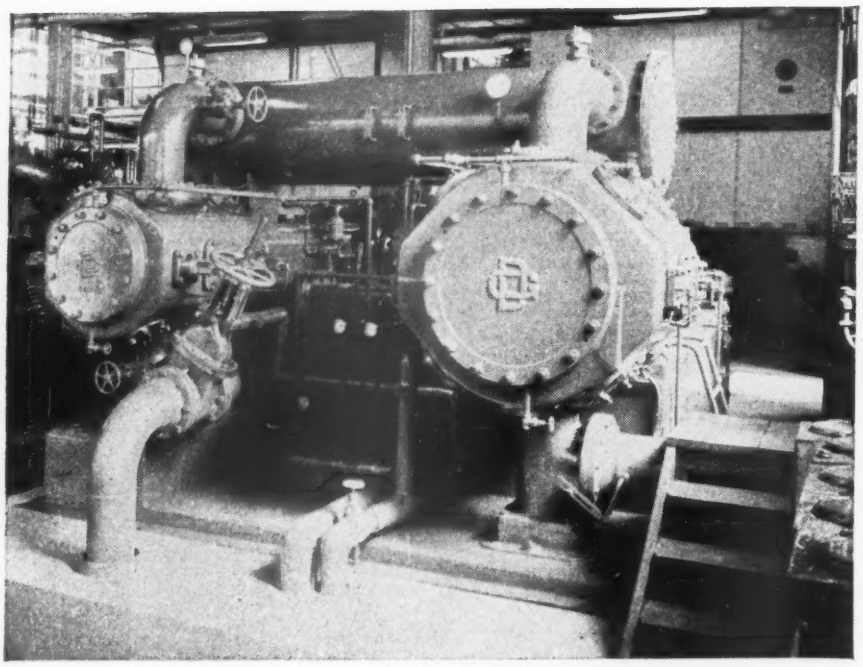
Use furnace linings by

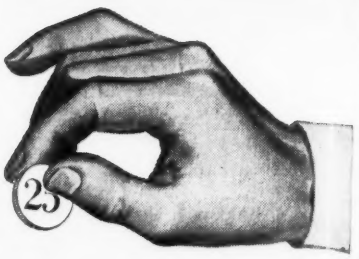
CARBORUNDUM

Trade Mark

for lower cost installation . . . operation . . . maintenance

"Carborundum", "Alfrax", and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Co





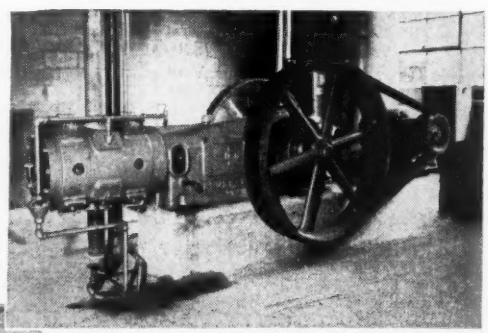
Pin Money Maintenance!

That's all it takes to keep a Gardner-Denver HA Compressor puffing away at top efficiency. One HA, for example, has been handling the full air load in a southern foundry and manufacturing plant for eight years—and has required only $10.00 for maintenance. That's $1.25 a year!

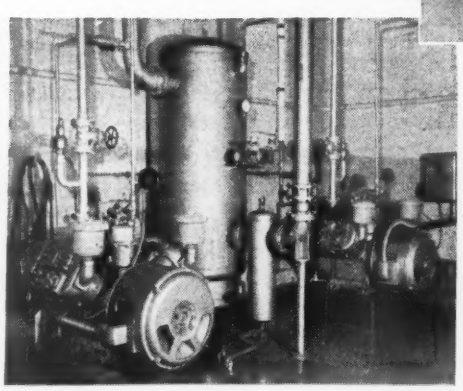
How come? A look at the soundly built power end and the reliable lubricating system will give you some of the answers.

And how about operating costs? They're unusually low, too—thanks to Gardner-Denver correctly designed air cylinders and low-lift "Air Cushioned" valves.

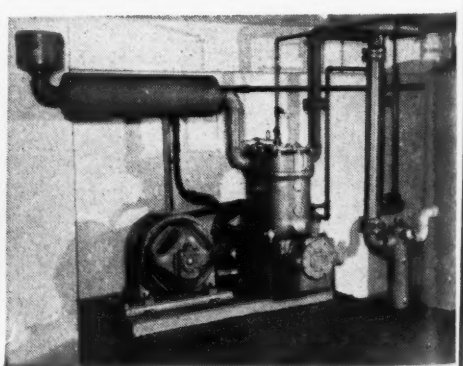
Another dependable compressor —the Gardner-Denver RX.



Space-saving efficiency—with Gardner-Denver WB Compressors.



For low-cost compressed air in any volume—choose Gardner-Denver Compressors. Write today for full details.



For continuous service— Gardner-Denver AA Compressors.

SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada:
Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

Announcing

the first showing of

FREMONT'S

New

SPREADLOCK FLASK

at the

International Foundry Congress and Show

May 1-7 Atlantic City

Be sure to see this new flask in

BOOTH 433

★

THE FREMONT FLASK COMPANY

FREMONT, OHIO

Better All The Way

WITH NVX IN THE GREEN SAND FACING

These unretouched pictures (Courtesy Farrell-Cheek Steel Company, Sandusky, Ohio) tell a big story of what a little Hercules NVX in your green sand facing can do to give you better molds and better castings.

NVX improves sand flowability and workability—means more firmly rammed molds. Even in this deep-pocketed pattern, there were no peening or ramming problems.

NVX gives good draw. It also keeps the sand from drying out—means a better first finish, less time spent in final finishing. Note the smooth surfaces on this massive steel casting, shown as it came from the mold.

These results are typical of those you can get on castings of any size or shape. And remember that your green sand facing will need no more than one-half of one per cent by weight of Hercules NVX.

Send for technical data. 100-lb. lots of NVX for testing are available from Hercules at the 1000-lb. price.

HERCULES POWDER COMPANY
INCORPORATED

Naval Stores Dept., 920 King St., Wilmington 99, Del.

NF52-2

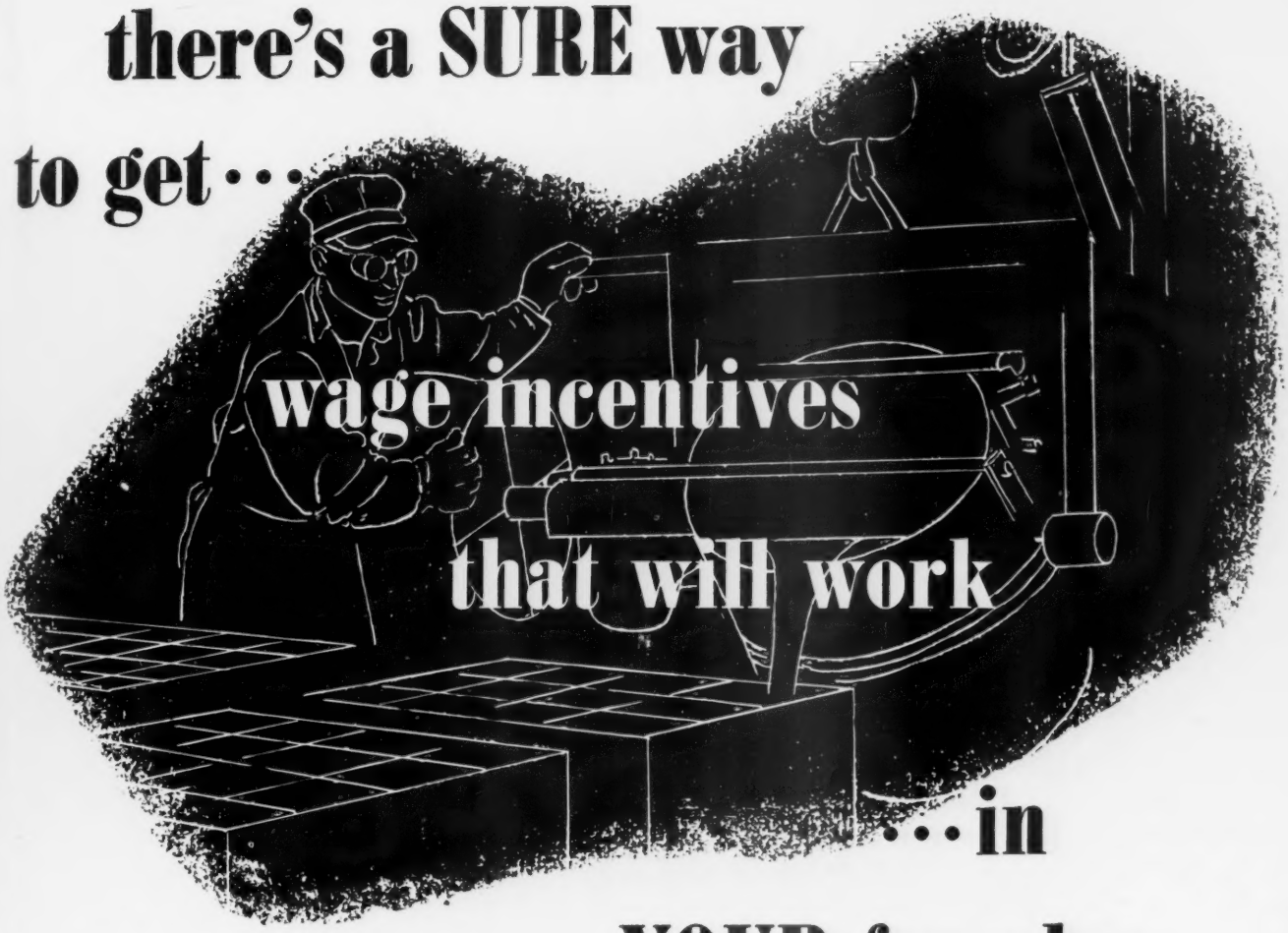
FROM PATTERN...

TO MOLD...

TO CASTING...

SAVE TIME AND MONEY WITH *HERCULES*® NVX

there's a SURE way to get . . . wage incentives that will work . . . in YOUR foundry



INCENTIVES that result in maximum unit production at a profit should be specially designed to work in a foundry and, more important, to meet your own particular requirements.

A sound incentive plan should also take into consideration the specialized methods, rigging and equipment factors involved in your foundry operation. Fair production standards must reflect work content for the jobs in such departmental operations as pouring; melting; molding; coremaking, finishing and assembly; grinding, chipping, cleaning, scarfing and finishing. "Take home pay" must reflect the uninterrupted effort to produce. Proper incentives for your foundry are a useful tool to provide improved quality, simplify supervisory problems, eliminate delays and interferences to production, and secure more and better casting production at lower costs.

Knight Engineers have revamped existing incentive plans and installed new standards for labor and cost control, wage incentives and estimating which have resulted in increased unit and total production plus increased profit.

An audit of your operations should determine the advantages of modernizing your present standards and incentive system. We will work with your industrial engineers. Call or write our Chicago or New York office for immediate attention.

Lester B. Knight & Associates, Inc.

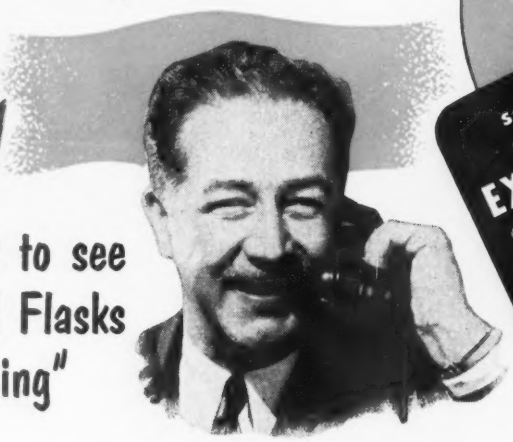
Consulting Engineers

Member Association of Consulting Management Engineers, Inc.

600 W. JACKSON BLVD., CHICAGO 6, ILL.

EASTERN OFFICE: LESTER B. KNIGHT & ASSOCIATES • 30 CHURCH ST., NEW YORK 7, N. Y.

"Say John, are you going to the Atlantic City Foundry Show?"



"I sure am! I want to see those Sterling Steel Flasks for Stack Molding"

STACK MOLDING with Sterling Flasks Can Triple Your Casting Production

You'll be agreeably surprised how much you can increase your foundry casting output by employing Sterling stack molding flask sections. You'll find them especially ideal for long runs of small or shallow castings. Molds are made in flask sections stacked one above another, to a height of 10 or 12 sections. The increased amount of hot metal in relation to the total flask volume generates tremendous heat with corresponding increase in gas pressure. That's why Sterling Steel Flasks are ideal for this modern method of molding. Sterlings are constructed of special rolled steel channel with reinforcing rib to prevent distortion and misalignment of stacked molds. They retain their rigidity and accuracy under constant production pressure.

• • • • •

Visit Our Exhibit at the Atlantic City Foundry Show — Booth No. 1618.

STERLING WHEELBARROW CO.
MILWAUKEE 14, WISCONSIN, U.S.A.

Pouring Flasks Stacked 10 High

A common sprue through the stack, feeds the molten metal to runners leading to individual casting cavities. Combines cope and drag in one flask section.

Sterling

Pioneers in the Manufacture of Foundry Flasks

A 7067-1PC

Stating the Case for Castings

THE ferrous castings industry recently presented the following statement and recommendations to Charles E. Wilson, director, Office of Defense Mobilization:

THE FERROUS CASTINGS INDUSTRY

The ferrous castings industry is composed of the foundries producing gray iron, malleable iron and steel castings, and is the second largest branch of the entire metals industry.

Production problems exist in the manufacture of castings for the machine tool program, air-force press program, tank program and others.

The industry comprises about 3500 units with an annual sales volume of approximately $6,000,000,000.

A measure of the importance of the industry to the economy is indicated by the fact that this sum is equivalent to one-fiftieth of the gross national product.

The industry, to a large extent, is composed of small and medium size units.

The products of the industry are essential to the maintenance of the civilian economy and the furtherance of the defense effort.

Products produced include castings for railroads, machine tools, automobiles and trucks, aircraft, rolling mills, hydro-electric power plants, tanks, ships, ordnance, farm machinery, and hundreds of others.

Ferrous castings are fundamental, basic components of practically all mechanical devices produced and must be supplied before such production can proceed.

In view of its importance, therefore, the ferrous castings industry submits the following recommendations:

1. That the Castings Section of the Iron and Steel Division, NPA, be made a Castings Branch and staffed with sufficient trained personnel to serve the needs of the industry and the defense effort.
2. That a comprehensive survey of the material requirements of the industry be conducted.
3. That top priority assistance be given to the production of foundry equipment.
4. That the handling of requests for tax amortization certificates covering defense facilities for ferrous foundries be expedited.
5. That industry integrating committees be appointed to provide for discussion on production problems and to make recommendations on casting design to the proper governmental or military authorities.

If the DPA will approve these recommendations and put them into effect, the ferrous castings industry will be in much better position to meet the demands of the defense mobilization effort for a wide variety of castings.

Frank G. Steinebach
Editor

By W. T. BOURKE and T. J. WOOD
Metallurgical Department
Brake Shoe & Castings Division
American Brake Shoe Co., Mahwah, N. J.

EFFECT OF
Basic Cupola Operation
On Tensile Strength of Gray Iron

ALTHOUGH considerable data have been published on the operating features of basic-lined cupolas, there is little information in the literature pertaining to the effect of this type of operation on the physical properties of gray (flake graphite) irons. In view of the growing interest in basic-lined cupolas it was felt that a summary of the results obtained on a full-scale pilot operation would be informative.

During the month of July, 1951, a basic lining was installed in a No. 9 cupola used for melting gray irons for a wide variety of miscellaneous castings. The lining consisted of magnesite brick in the well and melting zone extending to a height of 72 in. above the tuyeres. The magnesite brick were backed up with standard fire clay cupola blocks and faced with 3 to 4 in. of a proprietary patching material known as Gundol applied with a refractory gun. This material was also used for the daily patching. The cupola is of conventional design with intermittent tapping and rear slagging, 52 in. lined diameter, with a melting rate of 9 to 10 tons per hour.

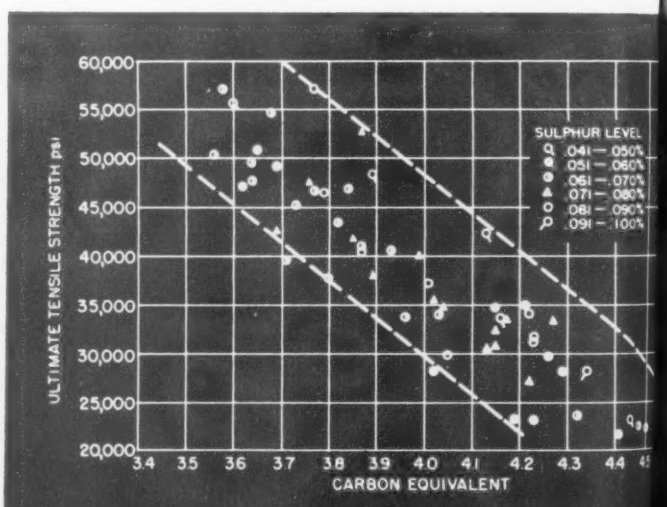
The basic lining was used for 12 successive operating days. Operations in general were satisfactory, but because of considerations beyond the scope of this paper, the lining was removed at the end of this period and standard acid operation resumed.

On the initial heats, considerable difficulty was experienced in maintaining carbon contents of the various grades of iron within the desired range. This condition was not unanticipated, and for this reason no Class 50 iron was produced until after the eighth heat, when means for controlling the carbon content were more definitely established.

In general, it was found that on the mixes which contained some pig iron, it was necessary to reduce the amount of pig charged and substitute steel rail. In this way the high carbon levels were brought back into the specified ranges. Mixes containing an initially high steel content such as Class 40 were satisfactorily produced by using about 18 per cent more steel (i.e., a steel content of 60 per cent instead of the normal 42 per cent) in the first four charges of this mix. The normal steel level (70 per cent) was adequate for Class 50 irons.

Silicon control was not difficult after the melting loss was established.

Sulphur levels were markedly lower in this operation as opposed to the range found in acid practice (and this occurred despite the fact that no effort was



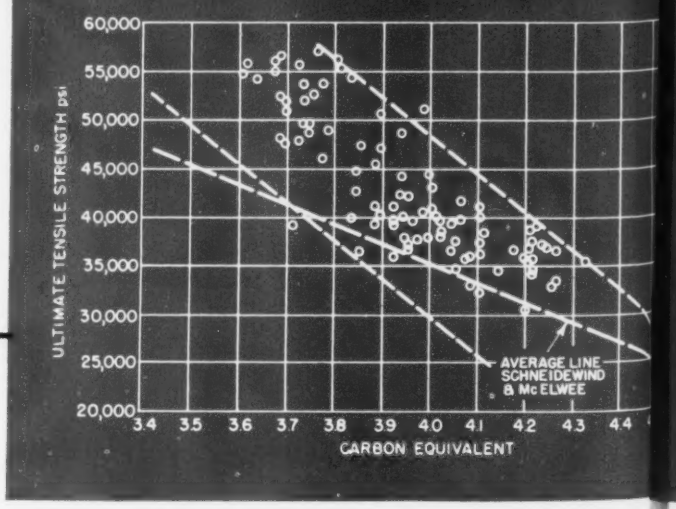


Fig. 1—Relation between carbon equivalent and tensile strength in gray cast irons produced in a basic-lined cupola. Fig. 2—Relation between carbon equivalent and tensile strength in gray cast irons when produced in acid-lined cupola

The authors' tests show that tensile strength of basic-cupola irons is a function of carbon equivalent, while sulphur content has no significant effect. However, the higher carbon levels usually associated with basic operation may be the indirect result of the low sulphurs obtained

made to produce strongly basic slags), particularly after the first two days' operation when lower sulphur shop returns entered the charges. The average sulphur range was between 0.05 and 0.07 per cent as compared with approximately 0.12 to 0.15 per cent for acid practice.

A total of 62 tensile tests were made respresenting 509 tons of metal charged. All metal tapped was inoculated at the cupola spout with a graphitizing inoculant. A plot of the (*Please turn to page* 217)

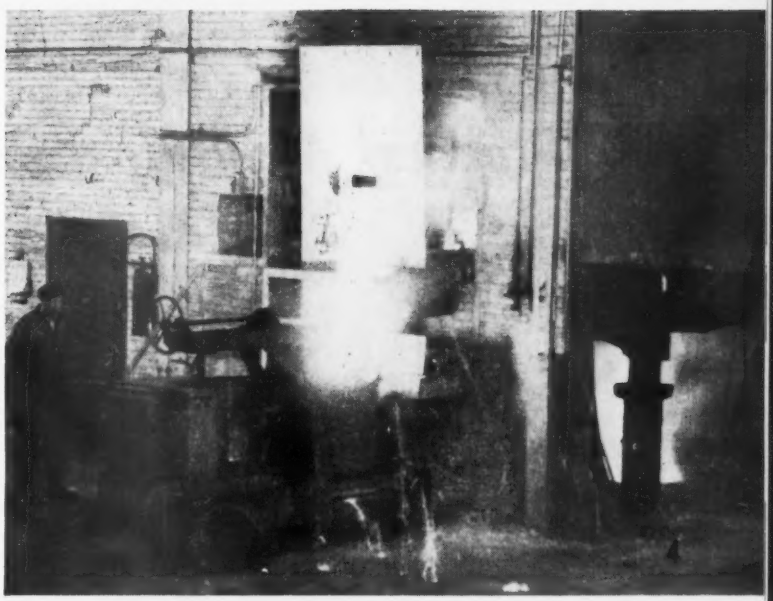
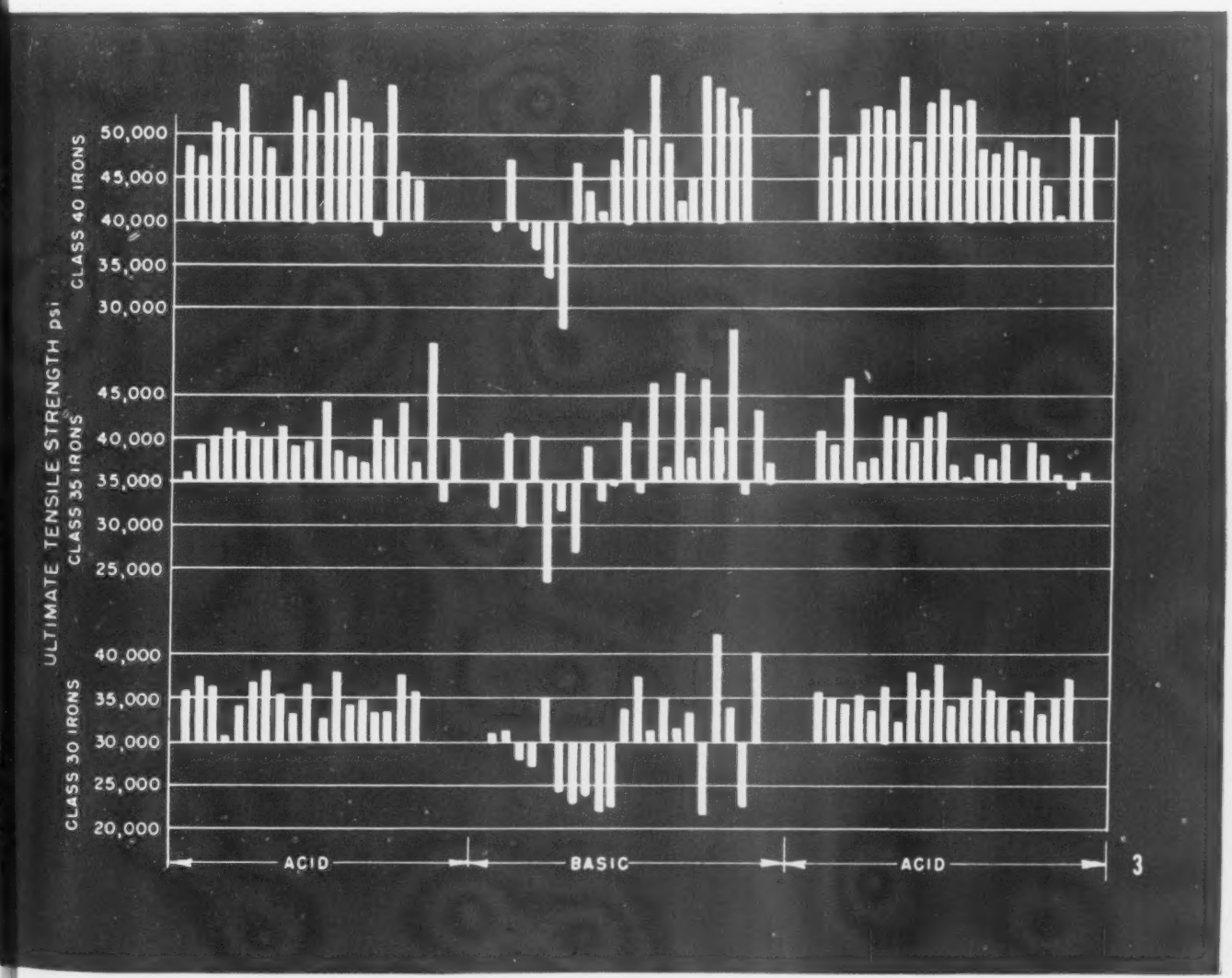


Fig. 4—Tapping a heat from a basic-lined cupola

Fig. 3—Comparison of daily tensile results for gray irons melted in acid and basic lined cupola



By HENRY W. ZIMNAWODA
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Chicago

Practical Application of SAND AND MOLD Handling Equipment

Handling methods in sand preparation and molding are discussed in this first of two articles. The author reviews practical arrangements of equipment and indicates the best means of material transportation from one station to the next. A concluding article next month will treat handling methods at the shakeout and in preparation for reuse of the sand

PRODUCTIVITY of any foundry can be improved by using properly arranged equipment for sand and mold handling. Possibilities for increased productivity and cost savings are enhanced by the fact that sand is the most volumious material used in the foundry; its total weight as it passes through production stations may be as much as 20 times the weight of the finished castings.

The number of men directly connected with handling sand and molds may represent as much as 80 per cent of total foundry personnel, and the equipment involved in this system represents the largest investment of a modern foundry.

Many foundry mechanization projects have failed because the original goal was lost in a mass of details. To obtain full benefit from mechanized units, a flow of production should be established and the main stations defined and organized The purpose of this discussion is to stress the need for improved sand and mold handling methods, to review practical arrangements of equipment and indicate the best means of material transportation from one station to the next. An outline of the broadly classified operations is depicted on the diagram at right above, showing the four main stations and the flow of loose sand and completed molds.

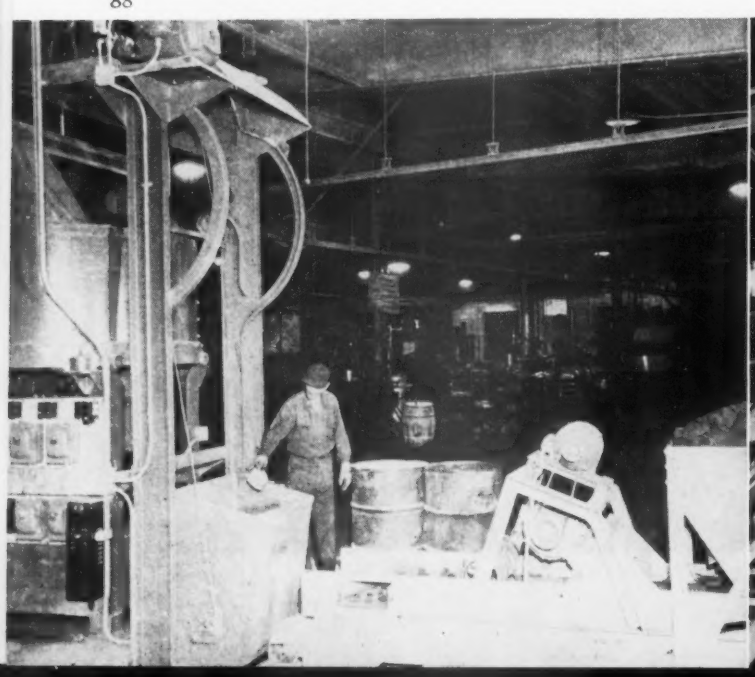
The main operations to be discussed in the four sections of this article are:

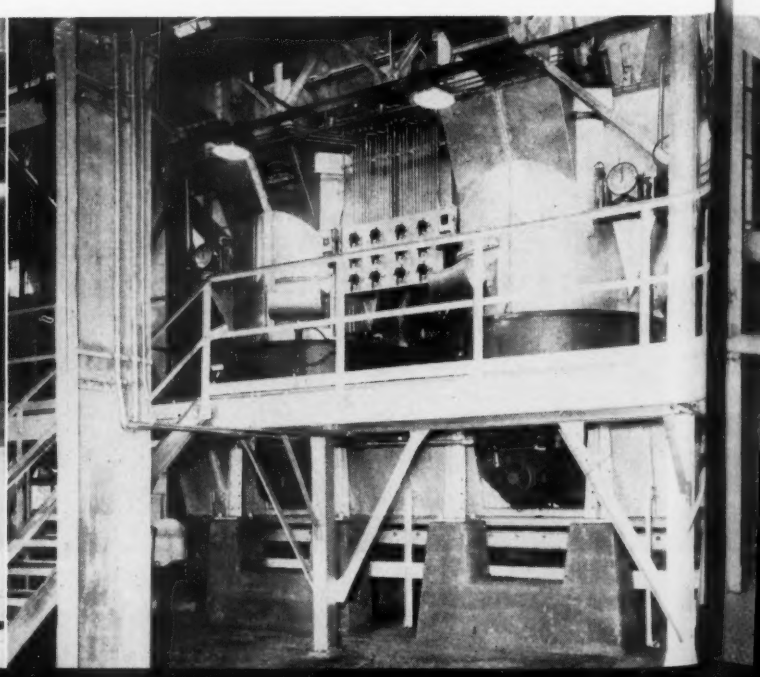
1. Sand preparation and distribution.
2. Production and handling of molds.
3. Shakeout of molds and handling of used sand.
4. Storage of sand and charging it into the sand preparation unit.

Other operations, taking place during the flow of production — such as aeration of prepared sand, cleaning, screening and cooling of used sand—also

Fig. 1—Compact sand preparation unit includes feeder, magnetic pulley, loader, mixer, aerator

Fig. 2—Two sand mixers located on a platform. Holding hoppers and belt conveyor are underneath





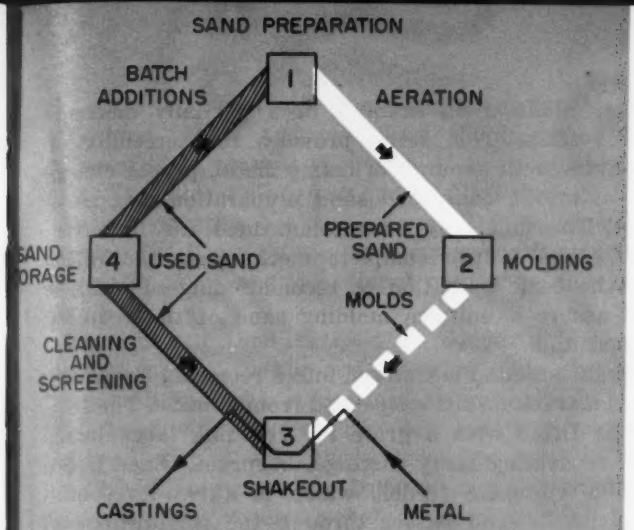


Diagram depicting sand travel through four stations: Preparation, molding, shakeout, storage

will be taken into consideration. For sake of brevity, coreroom operations, hot metal distribution and casting transportation methods will be omitted here.

Practical application of the equipment described and illustrated will increase the efficiency of each station and accelerate the flow of sand and molds. More molds will be made and poured on the floor available, and fewer men will be required. Consequently, manufacturing costs will be decreased considerably. The following improvements may be expected through use of mechanical equipment in the previously mentioned operations:

1. The uniform molding sand produced by controlled operations will promote smooth casting finish and reduce surface defects. The amount of scrap and cost of castings repair will go down. The overhead supply of prepared sand to molders will eliminate waiting time, relieve molders of shoveling sand by hand and keep them full time at molding operation. Production of molds will increase.

2. Fast movement of finished molds and synchronized pouring will assure the molders free space for their daily production. No waiting for space or molding equipment.

3. Continuous shakeout operation will eliminate night shift operation. Hand operators will be replaced by mechanical equipment. Gates and risers can be removed at a sorting conveyor and returned to the melting department without making a trip through the cleaning room, thus eliminating the rehandling of up to 50 per cent of total weight of castings. Hot shakeout sand will be moved by conveyors instead of being handled by a crew of men.

4. Undesirable storage of sand on the floor will be eliminated and space liberated for production purposes. Properly designed sand charging arrangement of the mixers will assure continuous operation of sand preparing unit at its rated maximum capacity.

Having in mind the diagram, let's proceed with the description of units, arrangements and methods of operations.

Sand Preparation and Distribution—Sand used for mold production varies, depending upon the type of metal being poured and size of castings produced. The shakeout sand is generally reconditioned by the addition of bonding materials, water and new sand. With a knowledge of production requirements a good base sand should be selected and the control of bond addition established. The greater the mulling efficiency, the less bond is necessary. Temperature of the shakeout sand varies during the day, as does the amount of core sand received at the shakeout station. The mixer operator has a responsible job in watching for these changes, as slight adjustments may be necessary in the sand mixing procedure. He should be informed daily about the types of molds in production.

Temperature of shakeout sand charged into the mixer is very important and should be watched closely. Moisture is the most important variable

Fig. 3—Bottom-discharge buggy distributes sand to molders' hoppers through grate in the floor

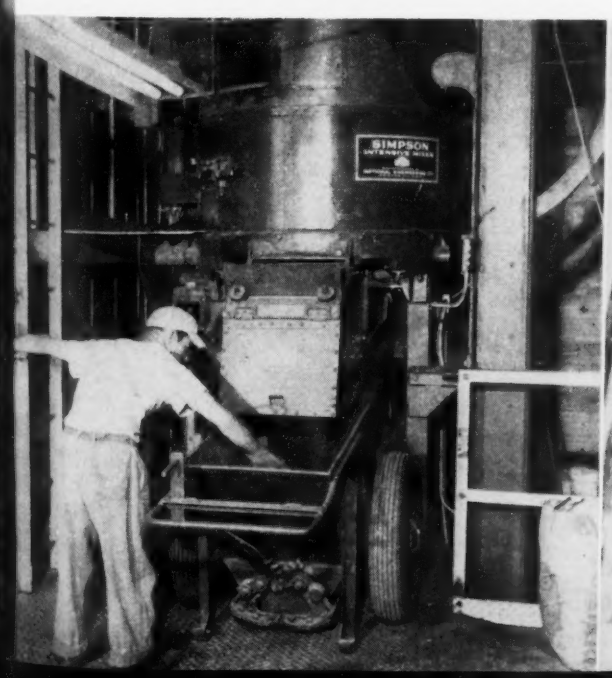
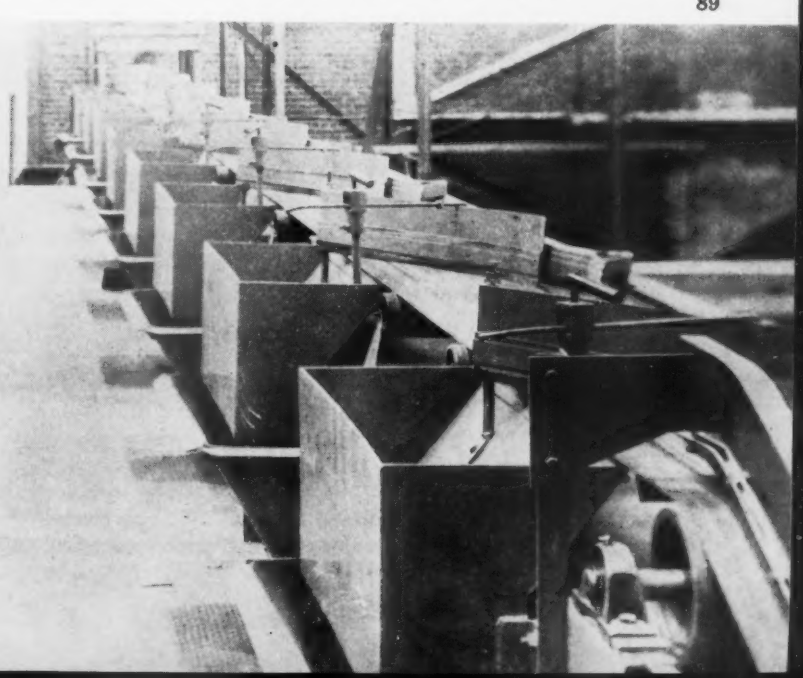
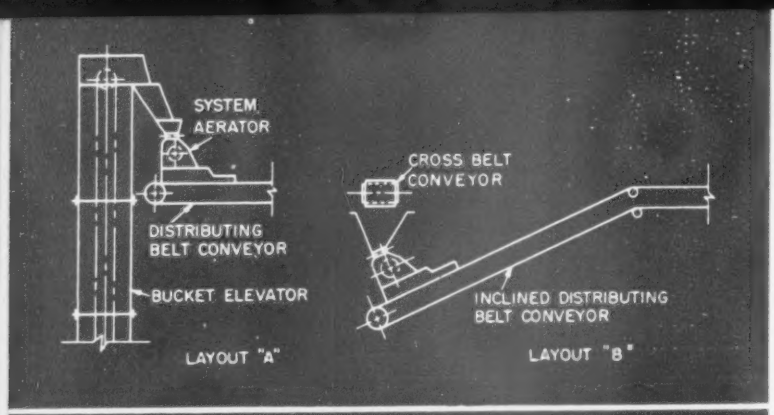


Fig. 4—Distributing belt conveyor has plows and directional chutes located over molders' hoppers





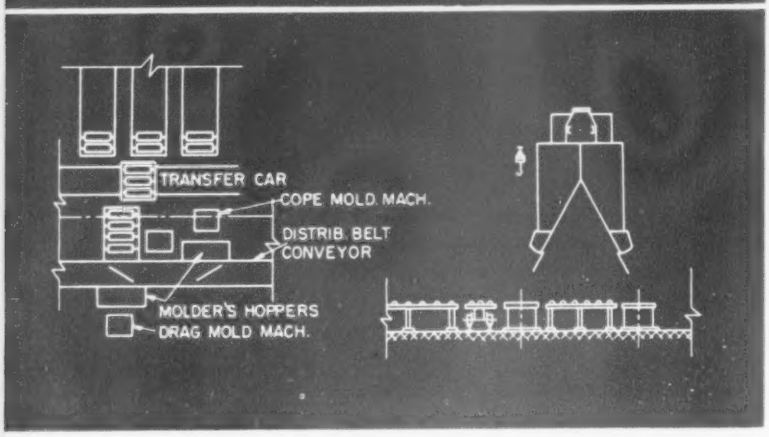


Fig. 5 (top)—Typical arrangements of system aerator

Fig. 6 (bottom)—Cope and drag molding station has transfer car which moves molds to the pouring lines

in controlling the uniformity of a synthetic sand mixture, and casting defects are traceable to poor moisture control through using hot sand, letting sand dry out, wetting down piles after mulling, etc.

Water addition at the mixer will not be proper unless changed according to sand temperature. For best results the use of a special instrument to record the temperature of the sand is desirable. The scale of this instrument is converted from degrees Fahrenheit into gallons of water necessary to maintain the required moisture content in the prepared sand.

Cooling the sand in the mixer is closely related to the addition of water. It is based on the principle of the heat loss by transformation of water into vapor. Some large production foundries use revolving cooling barrels and/or reciprocating flight conveyors to cool the sand before storage. This is a good practice but it requires a rather large capital investment.

Aeration of sand is the last phase in the sand preparation process and should be performed after the mulling cycle. Action of the aerator separates the already treated sand grains by the introduction of air into the sand stream. The molding sand acquires a better flowability. Thus the sand grains can flow in the direction of the ramming force with minimum of friction.

Application of mechanical units in sand and mold handling, schematically shown on the diagram, can be confined to one or two main stations and some sections of the transportation system.

Fig. 1 shows an example of a partially mechanized system. This setup provides for screening of sand, magnetic removal of tramp metal, proper charging of mixer, controlled sand preparation and aeration. The unit may be recommended for foundries who cannot afford complete mechanization. Fulfilling the basic operation of reconditioning of sand, it will assure a uniform molding sand of the required composition.

Shakeout sand is charged into a receiving hopper by special truck or box suspended from a crane. The hopper is fitted with a grate for crushing large lumps and separating stray castings or sprues. Sand is fed into a vibrating feeder, which is a two-level unit. The usable sand passes through the perforations of the upper deck onto the trough. Then it is passed over a magnetic pulley and charged into the bucket of the loader. Sand preparation is followed by aeration in a unit attached to the mixer.

When the foundry operates two mixers located on the same platform, prepared sand is usually discharged into the holding hoppers and received by belt conveyor. Fig. 2 shows such an arrangement. It is important that the hoppers are large enough to receive a total batch without holding up the mixer until sand can be taken away.

Before the sand is delivered to the molding stations it is passed through a system aerator, which should be located as close as possible to the molder's hoppers. Fig. 5 shows two typical arrangements. When floor space is restricted (which usually is the case) the prepared sand is lifted by an elevator and passed via aerator onto distributing belt (layout "A"). The bucket elevator is a practical unit for lifting sand to a desired level; however, it requires daily cleaning and when neglected may be easily plugged. For this reason some foundrymen prefer to transfer

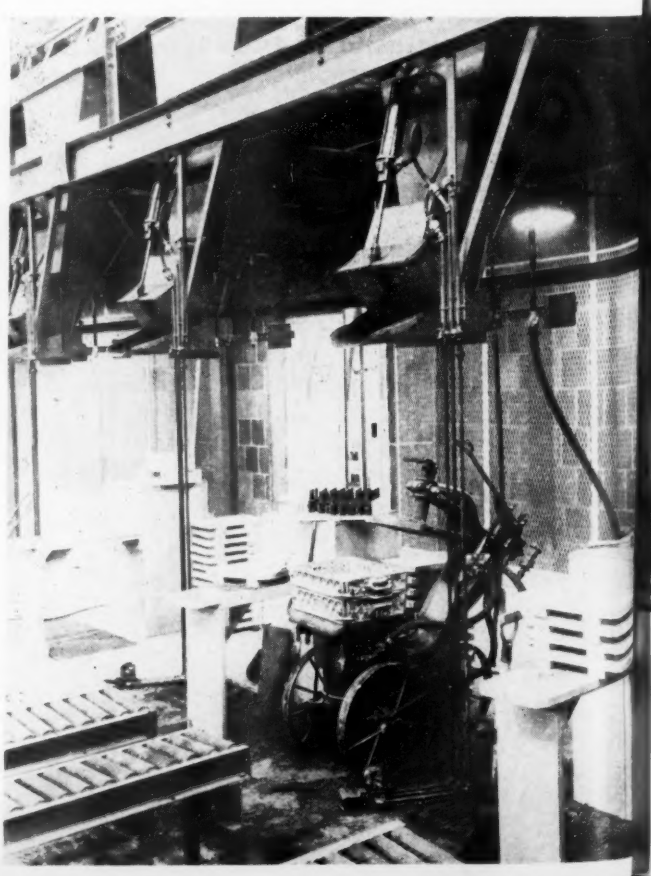


Fig. 7—Jolt-squeeze molding station. Air-operated gate of hopper is actuated by foot-pedal control

the sand from one belt to another as shown at "B."

Distribution of prepared sand should be as fast as possible to prevent reduction of its moisture content. The molder's hoppers can be filled through floor grates from the bottom gate of the hand-pushed buggy (Fig. 3) or by means of a belt conveyor equipped with plows and directional chutes as shown in Fig. 4.

The first method is used in connection with a smaller capacity mixer and fewer molding stations; the second method is a standard arrangement in most sand handling systems. The belt conveyor may be equipped with double plows delivering sand to two lines of molding machines from the same distributing platform. It is recommended to use "swing-in" type of plows so that each diverts sand from the belt at the approximate rate of use. This kind of plows requires less service than the "all or nothing" type.

Mold Production and Handling—Mold production methods vary, but in every case it is important to fill the flasks with sand as fast as possible. Undoubtedly the variety of molding machines available on the market is sufficient to meet all production demands; it is questionable, however, whether the importance of proper utilization of these machines is fully realized. By this we mean an adequate supply of sand and fast disposal of completed molds.

Starting with the production of small molds, the arrangements of molding stations, methods of sand delivery and handling of completed molds will be discussed.

Fig. 7 shows an example of a properly arranged molding station for a jolt-squeezer operation in connection with the conventional roller conveyor set up. The molder's hopper has an air-operated gate equipped with counterweighted chute directing the sand to the middle of the flask. A handy shelf permits temporary

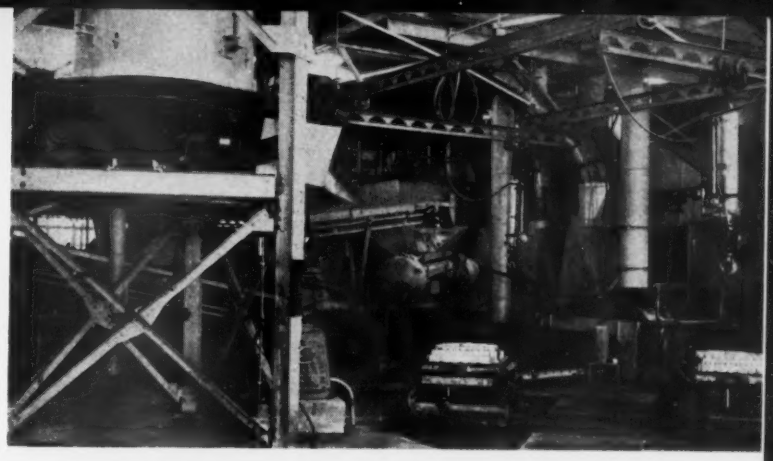


Fig. 9—Circular sand storage bin with plate feeder for delivering sand to a stationary sandslinger. Note two molding machines mounted on a turntable

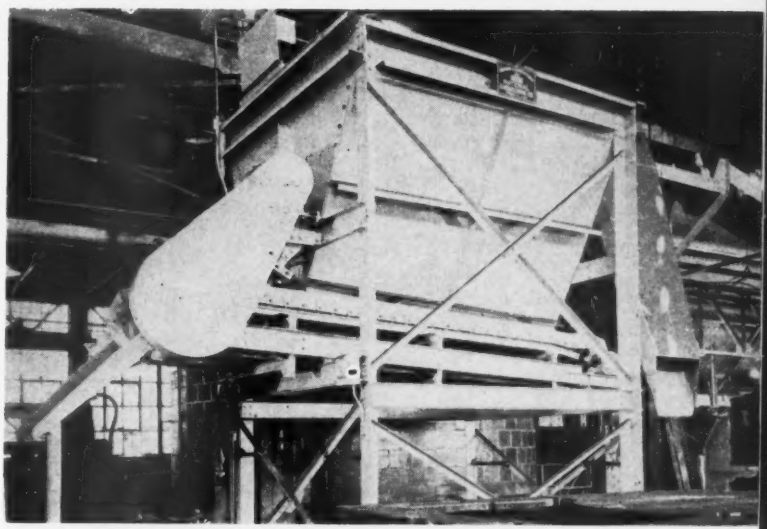


Fig. 10—Sand storage bin with apron feeder and chute for sand delivery to a motive sandslinger

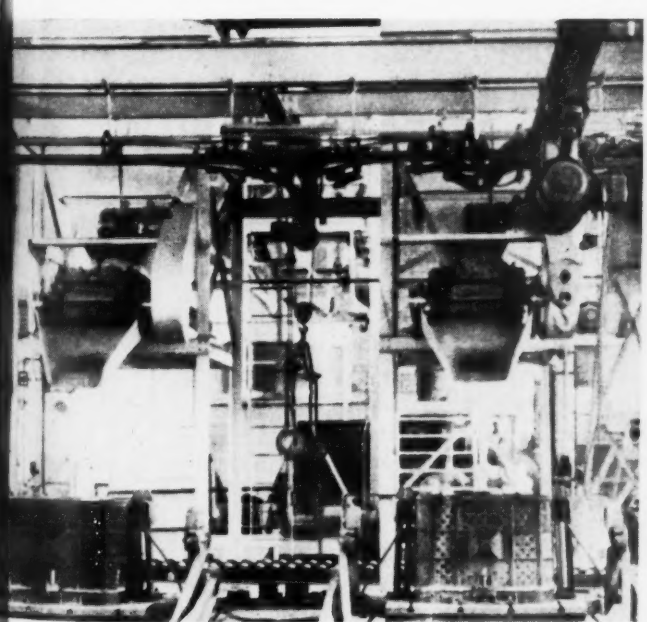


Fig. 8—Apron feeders attached to large molding machines. For better sand distribution in large flasks two feeders side by side are desirable

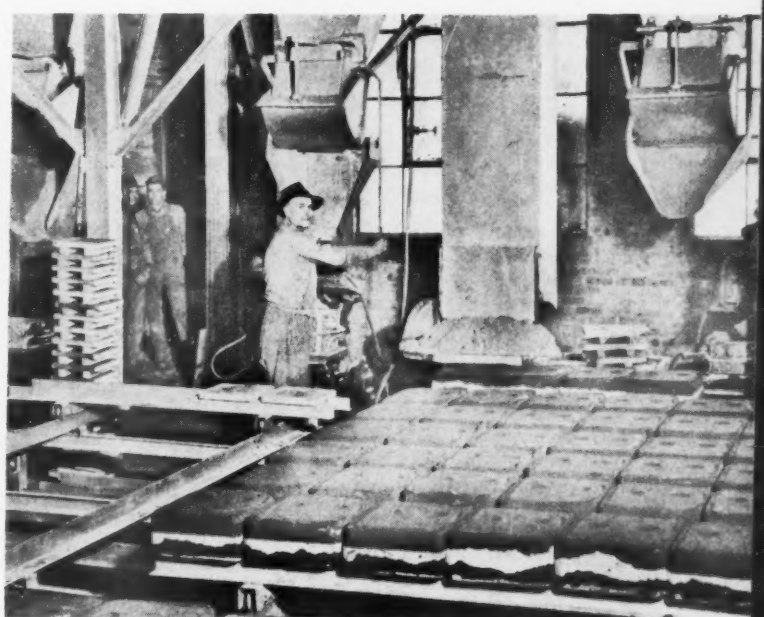


Fig. 11—Handling molds on pallets. Arrangement has two levels, the upper for mold storage, pouring, cooling; the lower to return pallets, boards

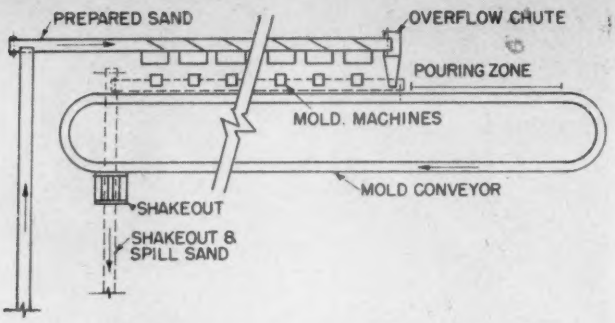


Fig. 12—Layout of continuous mold conveyor handling molds made in snap flasks on jolt squeezers

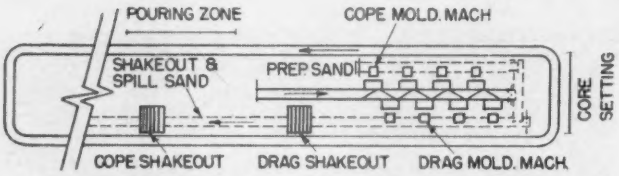


Fig. 13—Continuous mold conveyor handles molds made in tight flasks on cope and drag machines

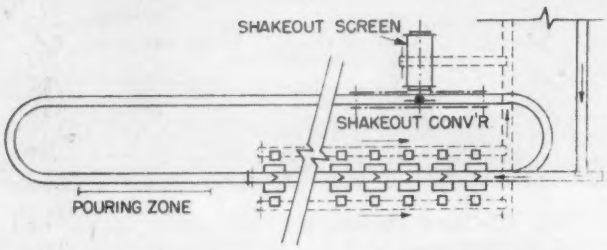


Fig. 14—Continuous mold conveyor for standardized small tight flasks has automatic shakeout conveyor

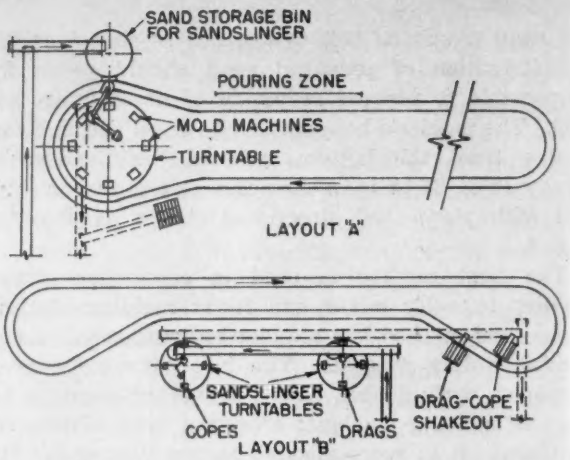


Fig. 15—Two layouts of mold conveyors used with sandslingers and molding machines mounted on turntables. *A* has cope and drag machines on one table; machines are located on separate tables in layout *B*

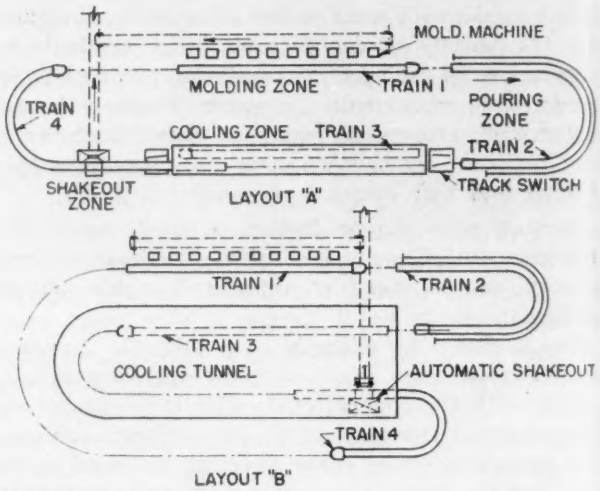


Fig. 16—Semicontinuous mold conveyors. Layout *A* employs track switches; *B* without track switches

storage of cores. A spill sand grate in the floor eliminates piling of sand around the machine. When facing sand is used, shovel-out hoppers are installed on the floor between molding machines (see Fig. 11). These hoppers are filled from the distributing belt conveyor by separate plows. The straight wall design and large discharge opening prevent bridging of the sand, as would take place in regular molders' hoppers, especially in case of steel facing sand.

A typical arrangement for cope and drag molding setup is illustrated in Fig. 6. In front of the drag rollover machine is a short section of roller conveyor used for setting cores. A transfer car directs the completed molds to the storage and pouring lines; a monorail crane and hoist arrangement can substitute for this car.

Production of larger molds requires hoppers of greater capacity and faster feeding rate of sand. These hoppers are usually equipped with flask fillers which may be of vibrating pan or apron conveyor type. Occasionally a swivel belt conveyor is installed at the end of the apron feeder to service two or three molding stations.

Fig. 8 illustrates apron feeders for large type molding machines. For better distribution of sand in larger size flasks two feeders located side by side are considered an efficient arrangement.

When the molds are filled with sand by a stationary sandslinger a circular bin with a plate feeder is usually applied as shown in Fig. 9. The bin discharges sand through a slot onto a revolving plate, the sand supply rate being governed by speed of the plate and height of the slot.

For very large floor molds a motive sandslinger is used to great advantage. A good example of a storage hopper with apron feeder for charging the sandslinger's tank is shown in Fig. 10 where prepared sand is delivered to the hopper by an inclined belt conveyor. A side chute visible at right is used for delivering sand into boxes, usually handled by crane to the floor, or pit molding stations, which are out of reach of the sandslinger.

According to our diagram we are now entering the section dealing with handling of molds before

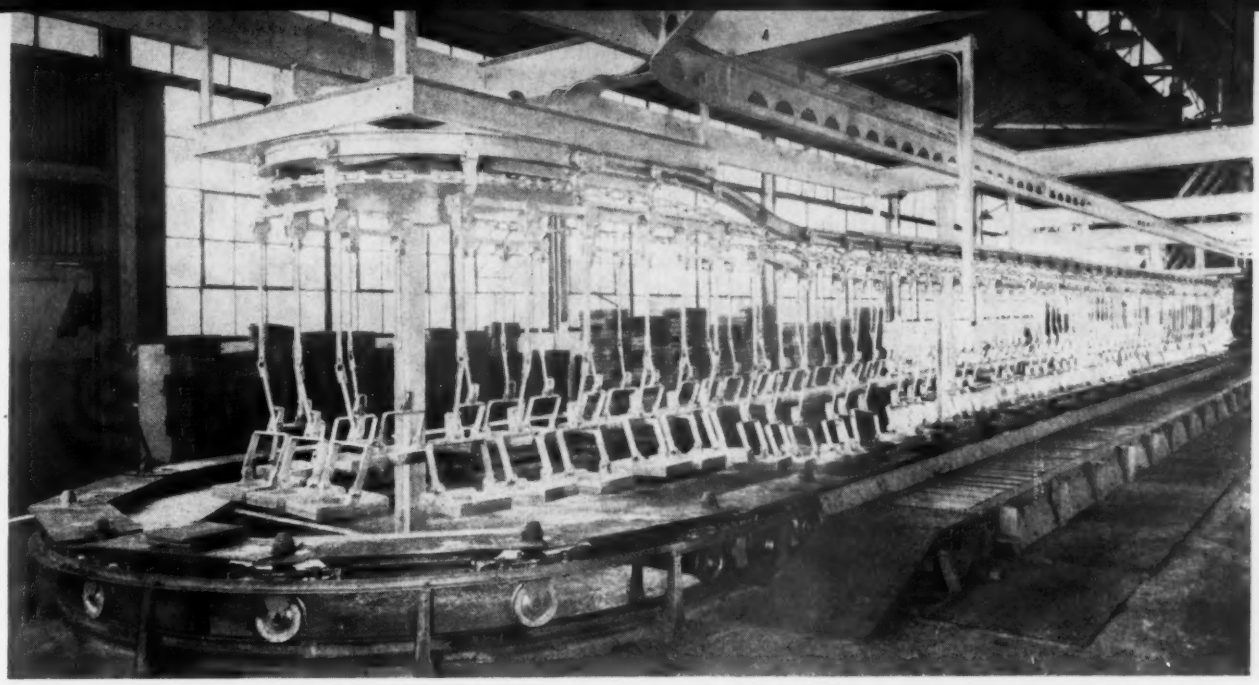


Fig. 17—Continuous mold conveyor equipped with both synchronized weight and pouring conveyors

and after pouring.

Completed molds are moved from the molding stations either to a storage area where the hot metal is distributed and the molds remain until they are cooled, or they may be conveyed to the central pouring station and cooled while moving toward the shakeout station. In the former case we employ gravity roller or pallet conveyors and the pouring can be intermittent or continuous; in the latter case the power-driven continuous or index type mold conveyor is used and continuous hot metal delivery is required.

The conventional roller conveyor arrangement for each molding station consists usually of two mold storage lines, one return line for empty flasks and/or bottom boards and a pouring aisle. This arrangement is usually applied when small heats are poured at various intervals of the day and/or several kinds of metal are required for certain groups of molds. Comparing this system with the method of mold handling on pallets, the latter allows almost complete utilization of the total floor space available.

The pallet arrangement is illustrated in Fig. 11. It consist of two levels, the upper for storage, pouring and cooling of molds, the lower for returning empty pallets and bottom boards to the molding stations. The ordinary practice is for the molder to remove the bottom boards of the pallet nearest to him and place the pallet on the storage rack in the upper level. After the pallet is filled with completed molds, it is pushed toward the pouring zone. Pouring usually is done from a monorail bridge crane which permits complete coverage of the pouring area. After the molds are cooled, one man is able to shake out the entire floor by using air-operated dumping devices, together with (*Please turn to page* 197)

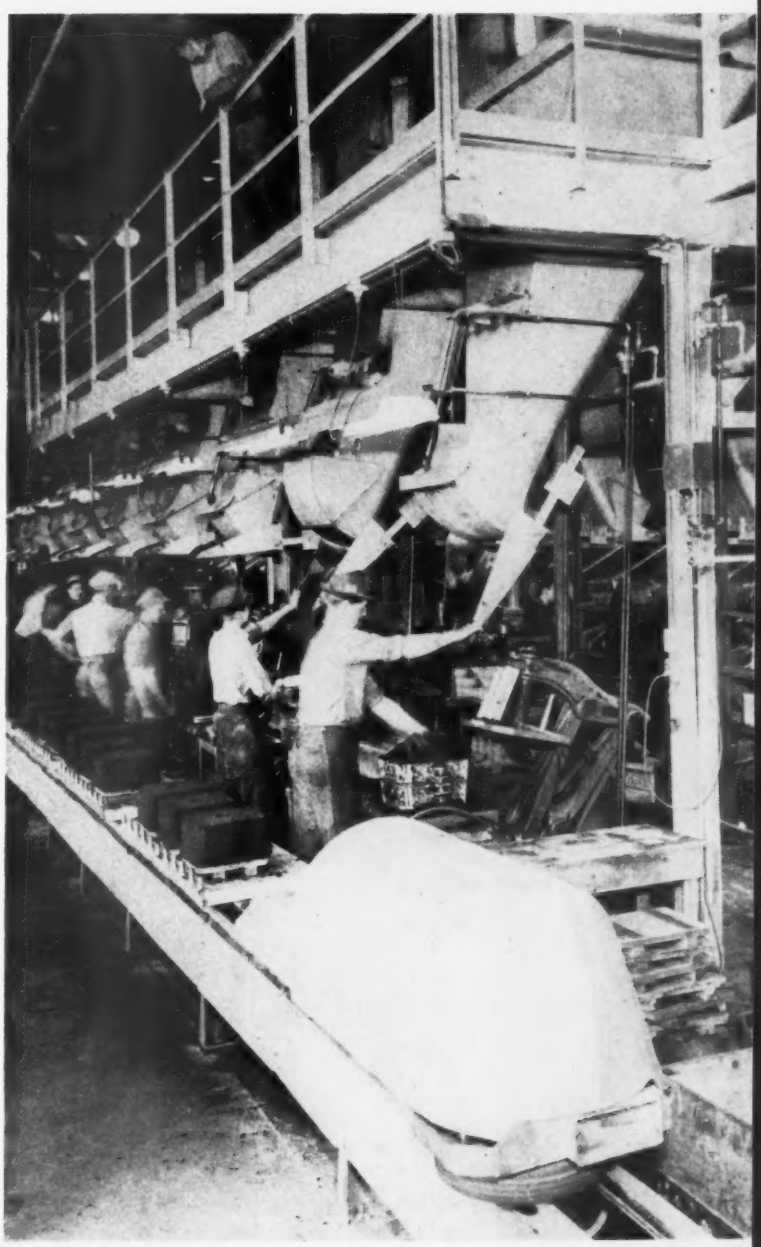


Fig. 18—Train of a semicontinuous mold conveyor shown stationary in front of the molding section

Nickel-Base NONFERROUS

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FOREMOST in the family of nickel-base alloys is Monel metal, a cast variety of its well known wrought metal companion. Long before low-carbon ferrochromium alloys were available for making stainless steel, Monel metal met the need for a highly corrosion-resistant material possessing the strength and toughness of steel. Monel metal did not rust. It showed a high order of resistance to the erosive action of steam or hot gases and to the corrosive action of numerous chemicals. It exhibited a high strength at elevated temperatures and a correspondingly good resistance to oxidation or tarnish. Time has not changed these basic advantages.

Technical progress has added to the varieties of Monel metal now in production. The expansion of the nickel-chromium heat-resisting alloys into the corrosion-resisting fields has distributed the burden of meeting engineering needs for a top-grade, high-strength, heat and corrosion resisting material which for years, Monel metal carried alone. This text will not deal with the iron-base alloys, but instead, will confine its alloy contents to alloys containing more than 50 per cent nickel.

The extension of knowledge about corrosion effects and the expanding requirements of a progressive in-

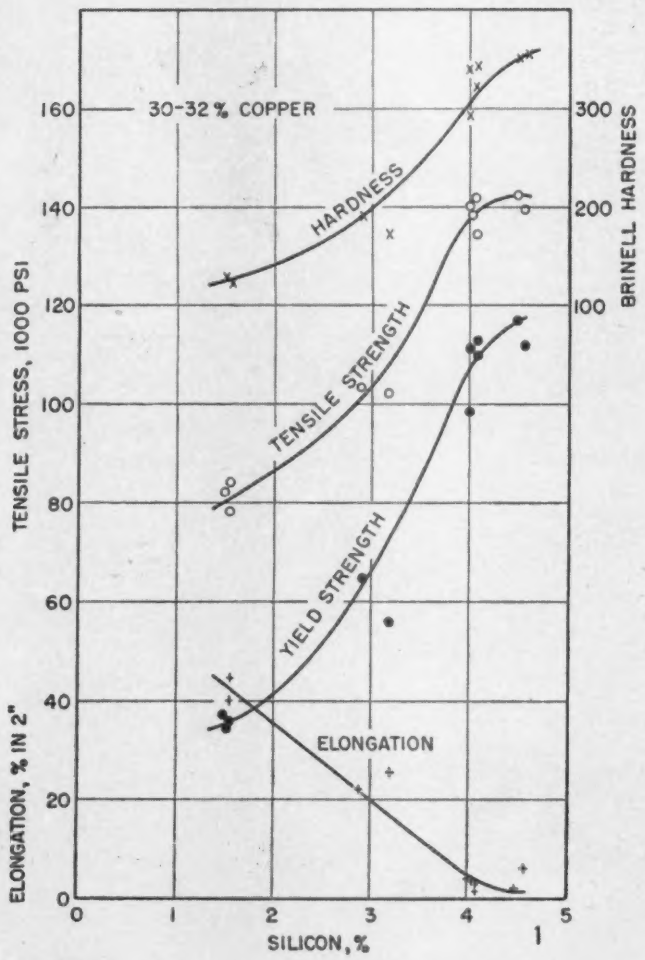


Fig. 1—Effect of silicon on the properties of cast Monel arc furnace heats (Kihlgren-Eash)

International Nickel Co. Inc. Research Laboratory, Bayonne, N.

CASTINGS

dustry, led to the development of new nickel-base alloys. Table I lists current modifications of the original Monel and nickel-base products.

An additional list of some of the better-known nickel-base cast alloys has been assembled in Table II. The advent of jet propulsion has brought in its wake an entirely new list of alloys, some of which are made at this time only in the form of precision investment castings.[1]

Economics, availability and specific environments largely determine the destination of these corrosion and heat resisting alloys. Nickel, for example, may be chosen for its good thermal conductivity and freedom from ingredients which contribute toward product contamination. More heat resistance is obtained by adding chromium to form Inconel. Molybdenum adds additional corrosion resistance in certain chemical environments. Copper additions form the Monel family. Special elements expand the useful range of these basic compositions.

The sea-water corrosion resistance of Monel is one of its earliest and lasting achievements. For the chemical industries, current publications of the International Nickel Co. Inc.,[2] and a recent article by Mott[3] mention many commercial applications. Monel may be silicon-alloyed to develop high hardness and greater high temperature stability. Table III and Fig. 1 illustrate this. Resistance to galling or sticking in metal-to-metal contacts is achieved, leading to extensive applications for valve trim, pump shaft seals or sleeves, etc. Chromium-silicon-molybdenum varieties of Monel have been experimentally developed and show considerable promise for similar purposes (Fig. 2).

The Durco, Chlorimet, Langalloy and Hastelloy alloys form a familiar group in which the nickel base is alloyed with substantial amounts of iron, chromium, molybdenum and silicon. Hard and strong, they find their applications in the hot and abrasive corrosives of the chemical and related industries. These alloys, with their high silicon or high molybdenum contents, go to work in the chemical fields where their outstanding resistance to strong hydrochloric and sulphuric acid asserts itself. Specific recommendations require a study of available data or its equivalent in experience to derive proper prescriptions. Illium, with its nickel base, is another entry into the list of alloys developed to end the search for an all-purpose heat and corrosion resistant metal. The Waukesha alloys, with a softer, milder consistency, are congenial companions for metal-to-metal contacts with the softer, highly corrosion-resistant metals of the nonferrous and stainless steel groups. They find many of their applications as bearings, bushings, sleeves and glands for mechanisms in the food-processing industries as well as in the contamination-sensitive, liquid-handling branches of the chemical industry. The leaded cupro-nickel and graphitic nickels of Table V are alloys devised for a similar purpose (See Figs. 3, 4, 5, 6, 7 and 8).

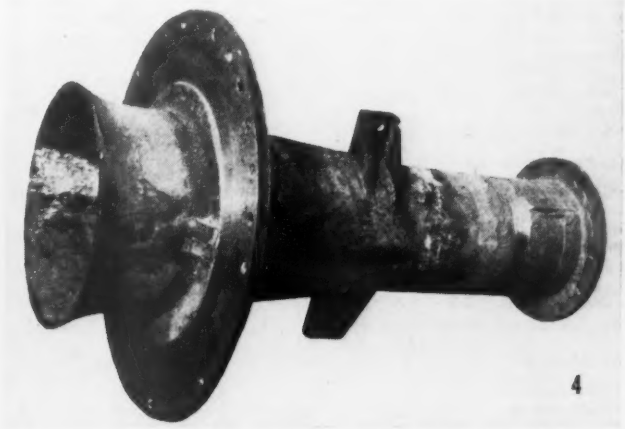
Production—The production of these alloys is a specialist's feat. Rapid melting and high pouring temperatures favor the use of electric induction or arc furnaces. Crucible melting, especially of the lower-melting temperature, nickel-copper alloys, is still widely practiced. Oil-fired melting furnaces are preferred, but propane or natural gas-fired furnaces do well and, with expert care, coke-fired crucibles may be successfully used, as they have in the past, before oil or electric melting systems were available.

The metals must be protected from contamination by the refractories, fluxes or fuels. Sulphur is a common contaminant frequently originating in the fuel. Carbon in excess may come from the crucibles or refractories. Lead and boron may enter by way of fluxes.

A very small amount of lead sharply lowers the

Fig. 2—Impeller for Cast Monel centrifugal pump. Fig. 3—This pump cylinder liner (Hastelloy) finish ground is used on a pump handling acid tar having 40 to 60 per cent sulphuric acid content at 250°F. Weight is 51½ pounds. Fig. 4—Nozzle for vacuum booster was cast from Hastelloy alloy

Haynes Stellite Co., Kokomo, Ind.



Haynes Stellite Co., Kokomo, Ind.

Duriron Co., Dayton, O.

Duriron Co., Dayton, O.

hot strength of Monel, as indicated in Fig. 9.

The melting practice for Monel metal and similar alloys has been recently described by Eash and Kihlgren.[4] Oxidizing and deoxidizing practices for these alloys have been developed to a fine art.

Gating, risering and molding practice resembles that used for steel rather than for nonferrous metals. Riser volumes as well as runner areas and riser neck areas need to be at least 50 per cent greater than those used for tin bronzes. In the case of Monel metal, dry sand molds are preferred for pressure castings or castings exceeding 10 lb in weight. Green sand molds, skin dried, may be satisfactory for light sections and small castings. Typical sand mixes are shown in Table IV.

Organic binders should be used sparingly. Pure silica sand and linseed oil binders should be used for cores. Ample vents should also be provided. For Monel metal and similar nickel alloys, pouring temperatures in the range of 2700 to 2850°F are necessary. Melting temperatures may need to be 100 to 150°F higher.

Engineering Properties—Corrosion resistance is a primary requirement in these alloys. Supplementary properties are resistance to seizure or galling, resistance to cavitation or "wire-drawing," and resistance to tarnish or deterioration at elevated tempera-

TABLE I—Nominal Composition and Properties of Monel, Nickel and Inconel Castings

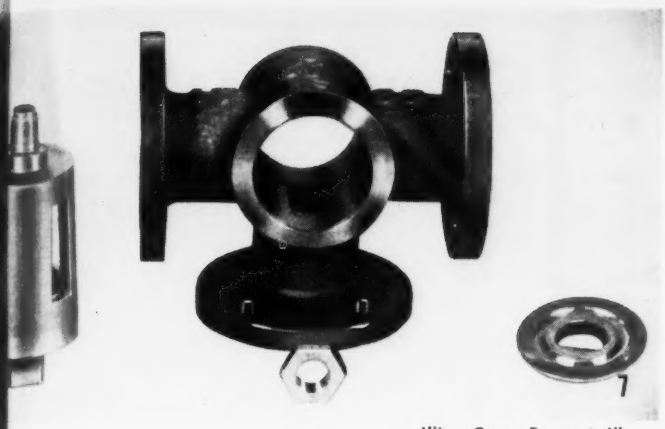
Material	Condition	Ni	Cu	Fe	Mn	Si	C	S	Cr	Yield Point, 1000 psi	Tensile Strength, 1000 psi	Elongation in 2"-%	Brinell Hardness, 3000 Kg	—Impact Strength— Std. Izod ft-lb	Std. Charpy ft-lb
Monel	as cast	63.00	32.00	1.50	0.75	1.60	0.15	0.015	....	32-40	65-90	45-25	125-150	80-65	70
"H" Monel	as cast	63.00	31.00	2.00	0.75	3.00	0.10	0.015	....	60-80	90-115	20-10	175-250	45-35	40
	as cast annealed									80-115	110-145	4-1	275-350	9-3	4
										....	....	....	225-260	....	..
"S" Monel	annealed and age hardened	63.00	30.00	2.00	0.75	4.00	0.10	0.015	....	80-115	110-145	4-1	300-375	5-1	..
Nickel*	as-cast	97.00	0.30	0.25	0.50	1.50	0.50	0.015	....	20-30	45-60	30-15	80-125	90-75	60
Inconel	as cast	77.50	0.25	6.00	0.80	2.00	0.20	0.010	13.50	30-45	70-95	30-10	160-190	85-70	60

* See also Table V.

TABLE II—Nominal Composition and Properties of Some Nickel-Base Casting Alloys

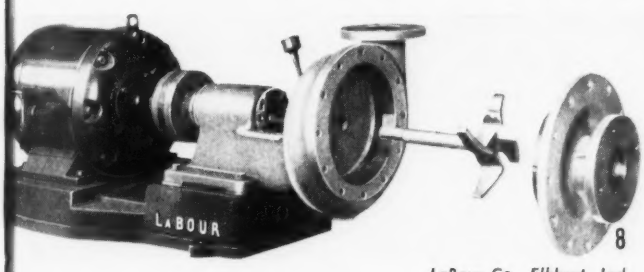
Material	Ni	Cu	Fe	Cr	Mo	Al	Si	Mn	W	B	Form	Yield Strength (0.20% Offset) 1000 psi	Tensile Strength 1000 psi	Elongation in 2"—%	Brinell Hardness 3000 kg
						Fe+Si+C									
Colmonoy	65–75			13–20		10 max.				2.75–4.75					56–62 *
Durco 10	65	3.5	5	23	2			1.00			castings	30	60	20	180
Chlorimet 2	62		3		32		1.00				castings	55	80	6	230–475
Chlorimet 3	60		3	18	18		1.00				castings	50	75	10	220–300
Hastelloy A	53		22		22		1.00	2.00			as cast	42.5–45.0	69–77.5	12–8	155–200
											rolled, annealed	47–52	110–120	48–40	200–215
Hastelloy B	60		6		32		1.00	1.00			as cast	55–57	75–82	9–6	190–230
											rolled, annealed	60–65	130–140	45–40	210–235
Hastelloy C	51		6	17	19		1.00	1.00	5		as cast	45–48	72–80	15–10	175–215
											rolled, annealed	55–65	115–128	25–50	160–210
Hastelloy D	85	3.0				1	10.00	1.00			as cast	36–40.5	36–40.5	0	55–50 *
Illium G	60	3.0	8	21	5		1.00	1.00	1				60–73	9.5–4	210–160
Langalloy 4R	63		5		30		0.75	0.75			castings		70–80	5–10	200–250
Langalloy 5R	56		5	15	17		0.75	0.75			castings		70–80	8–12	180–220
Langalloy 6R	85	3.0					10.00				castings		55–78	0–3	350–400
Waukesha 50	50–60	Sn	14	16 Zn	1 Pb		1.00					40	50	6–12	110
Waukesha 23	78	8	8	4				2.00				35–45	45–55		

* Rockwell C. Notes: Alloy 1—Wall Colmonoy Co., Detroit; 2, 3, 4—Duriron Co., Dayton, O.; 5, 6, 7, 8—Haynes Stellite Co., Kokomo, Ind.; 9—Illium Corp., Freeport, Ill.; 10, 11, 12—Langley Alloys Ltd., England; 13, 14—Waukesha Foundry Co., Waukesha, Wis.



Illium Corp., Freeport, Ill.

Fig. 5—Pump casing made of Chlorimet 3, illustrating gating and risering system. Fig. 6—Valve body casting in Chlorimet 3. Fig. 7—Valve castings in Illium for highly corrosive applications. Fig. 8—Pump casting in R-55 alloy, a special nickel-base composition for severe corrosion service

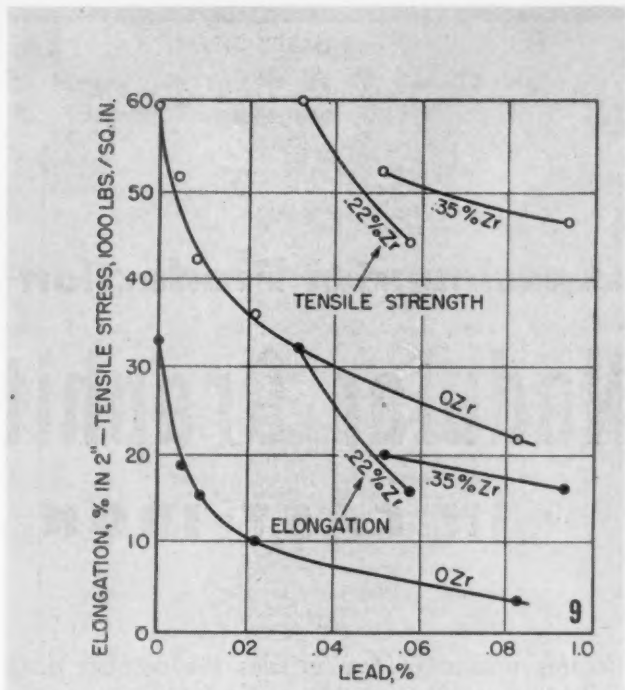


LaBour Co., Elkhart, Ind.

tures. With nickel as a basic ingredient, strength and hardness are developed in the copper containing alloys by additions of silicon, tin, manganese, iron and aluminum. Silicon-alloyed composition of the "H" Monel and "S" Monel type (Table I) are in this class. They may be softened or hardened, within limits, by heat treatment. "S" Monel may be cast with a hardness of about 320 Bhn. It may be softened by heating to 1600° F, holding for one hour per inch of section, air-cooling at 1200° F, then oil quenching. This lowers the hardness to about 230 Bhn. Rehardening may be accomplished be reheating to 1100°F for four to six hours and furnace cooling.

A rough comparison of the hardness of Monel with a few other common cast metals is illustrated in Fig. 10. The high hardness of "S" Monel contributes to its usefulness as a valve trim or pump shaft sleeve material in water works applications or for sea water and marine service, as well as in chemicals and other corrosives for which it is suited. "S" Monel mated with regular Monel frequently makes a good combination for resisting seizure or galling in metal-to-metal contacts. Tests measuring the resistance to galling of nickel alloys, have been devised[5]. Typical results upon nickel alloys, run dry, are shown in Table V and Fig. 11. Load-displacement curves, which become flat and indicate an equilibrium, supported by visual assurance of the absence of galling on the contact surfaces, are considered adequate evidence of a resistance to seizure for the loads applied.

Tin-alloyed (No. 14), nodular graphitic nickel (No. 12), and silicon-alloyed nickel (No. 16) indicate a



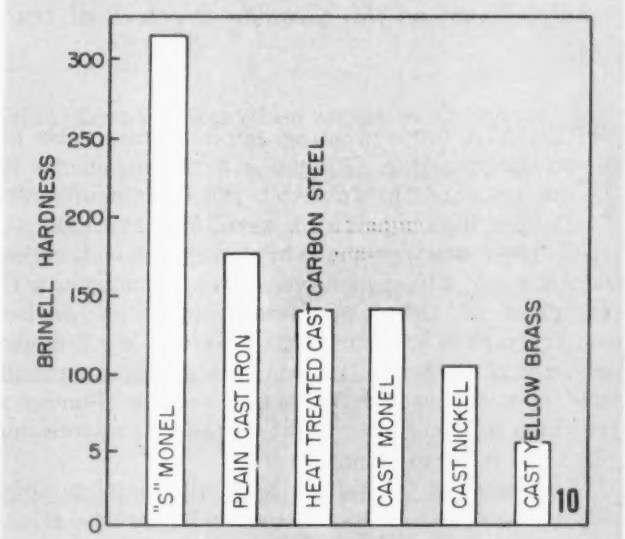


Fig. 9—Hot strength is sharply reduced by lead. Zirconium partially restores tensile properties of cast Monel at 800°F. Base melt is 69% Ni, 1.25% Si, 0.50% Mn, 1.5% Fe, bal Cu. (Eash-Kihlgren, *Transactions*, AFS, Vol. 57, 1949, p. 535)

Fig. 10—As-cast hardness of some commercial products. Hardness of cast iron and cast steel can be doubled by appropriate heat treatment

high order of resistance to seizure. Flake graphite in nickel (No. 11) would appear to excel a larger amount of nodular graphite (No. 12). Amsler wear tests for less than 2 million revolutions under severe loading conditions, have been used to reveal wear and galling tendencies. Weight and (*Please turn to page* 257)

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Washington

Experimental Production of Nodular Graphite IN CAST IRON

In this second of two articles the authors discuss the effect of treatment with iron sulphide, boron, magnesium oxide, magnesite, calcium and nickel-chromium-molybdenum on the graphite structure of cast iron

THE DATA for a group of selected heats made of a low-phosphorus iron (P) and a high phosphorus iron (K) are presented in Table VI. The maximum heating and the pouring temperatures were 1500° and 1340° C, respectively. The heats were made in clay-graphite crucibles, except heats 309 and 310, which were made in magnesia crucibles. Regardless of the magnesium content no predominantly nodular graphite structure was observed in 1.2-in.-diam bars cast from these heats. Instead, the graphite structures consisted of a mixture of flakes and nodules. Similar graphite structures were observed in the wedge bars at sections located only 1 in. from the tip.

The cause of the failure to obtain complete nodulization with irons P and K is not readily apparent. It cannot be ascribed to the phosphorus content since it is known that phosphorus up to 1.0 per cent does not inhibit the formation of nodular graphite[11, 12]. (High phosphorus contents are objectionable because of their embrittling effect on the matrix, not because they inhibit nodulization.) Furthermore, in the present investigation nodular structures were obtained in other irons with phosphorus contents equal to or greater than that of iron P. In the case of iron P, it is possible that impurities, particularly zinc, from a previous melt of brass in the crucible, may have acted as inhibitors. Spectrographic analysis revealed the (*Please turn to page* 241)

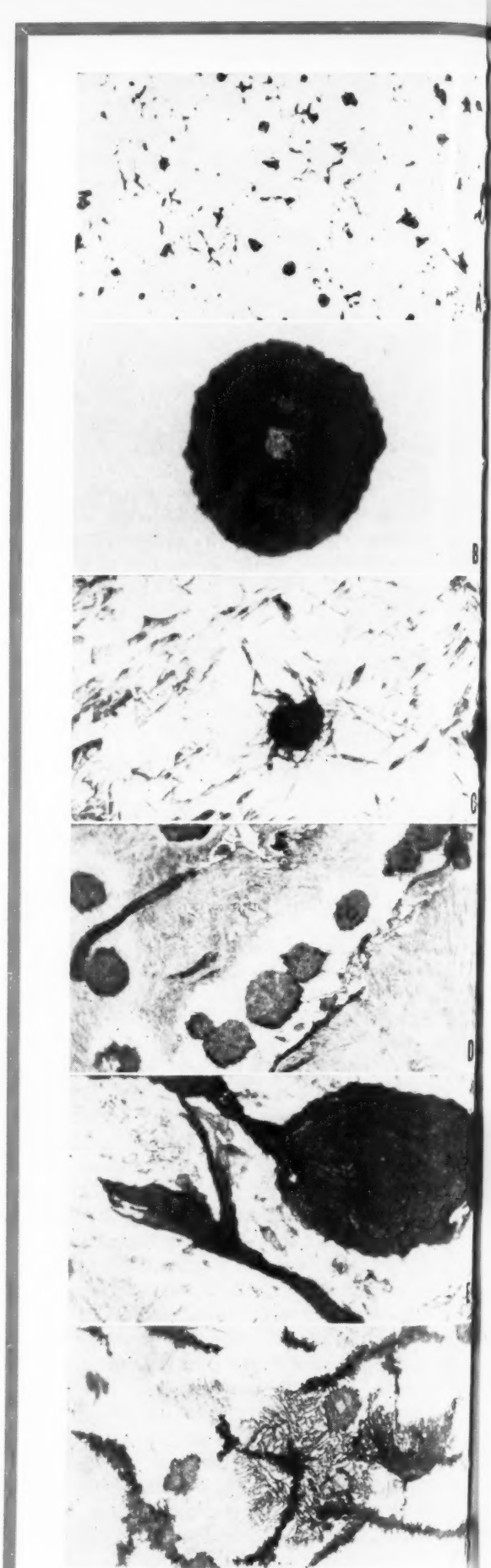

Fig. 6—Graphite nodules observed in irons not treated with magnesium. A—Sand-cast bar from heat 329, treated with calcium-silicon. Unetched. x100. B—Same as A. X 500. C—Water-quenched spheroid from heat 316 treated with copper-calcium. Etched with 1 per cent nital. X 1500. D—Ni-Cr-Mo iron. Maximum heating temperature, 1700°C. X 500. E—Same specimen as D. X 1500. F—Ni-Cr-Mo iron. Maximum heating temperature, 1400°C. Etched with 1 per cent nital. X 500

TABLE VI—Heats Made of Irons P and K Treated with Magnesium Added as 80 Cu—20 Mg Alloy. Maximum Heating Temperature 1500°C, Pouring Temperature 1340°C

Heat No.	Iron Designation	Added %	Chemical Composition (% by wt) C	Si	Mn	P	S	Mg	Cu	Carbon Equivalent[1]	Bhn	1.2-in. Diameter Sand-test Bar Structure
301	P	0.4	3.33	2.53	0.78	0.08	0.012	0.037	0.75	4.11	269	Largely flakes. Nodules in periphery area, most in ferrite, some in pearlite
303	P	0.5	3.06	3.03	0.16	0.07	0.010	0.05	2.00	3.99	266	Largely flakes, few small nodules in ferrite rings. Matrix: pearlite, some cementite
304	P	0.5	2.91	2.82	0.76	0.07	0.008	0.10	2.00	3.78	293	Largely flakes, some nodules in ferrite, some in fine pearlite. Matrix: pearlite, some free cementite
305	P	0.5	3.05	3.01	0.40	0.067	0.008	0.09	2.00	3.98	285	Nodules and flakes. Some nodules in ferrite rings, some in pearlite. Matrix: pearlite, some free cementite
309	P	0.5	3.01	3.01	0.50	0.08	0.008	0.076	1.59	3.94	293	Largely flakes, some nodules, in pearlite. Matrix: pearlite, some free cementite, no free ferrite
310	P	0.6	3.18	3.04	0.50	0.07	0.007	0.10	2.39	4.11	341	Flakes and many nodules. Nodules in pearlite. Matrix: pearlite and massive cementite
261	K	0.4	3.64	2.29	0.52	0.77	0.012	0.066	..	4.56	249	Flakes and nodules. Nodules in pearlite. Matrix: fine pearlite, some free cementite, steadite
323	K	0.6	3.61	2.30	0.55	0.70	0.03	0.12	...	4.51	274	Flakes and nodules. Fine pearlite, steadite.

1. Carbon equivalent was calculated by formula % C + 0.3 (% Si + % P)

TABLE VII—Summary of Heats Treated with Iron Sulphide, Boron, Magnesium Oxide or Calcium

Heat No.	Iron Designation	Addition Agent*	Chemical Composition (% by wt) C	Mn	P	S	Si	Cu	B	Ca	Mg	Carbon Equivalent	Bhn	1.2-inch diameter Sand-cast bar Structure
IRON SULPHIDE (FeS)														
262	I	0.03	3.76	0.47	0.16	0.019	1.46	...	...	...	...	4.25	150	Graphite flakes and patches. Pearlite and ferrite.
263	I	.06	3.28	.41	.14	.027	1.39	...	...	...	...	3.74	175	Graphite flakes, and patches. Pearlite and ferrite.
263A	I	None	3.28	.41	.16	.011	1.33	...	...	...	...	3.73	175	Flakes, pearlite and ferrite.
BORON														
296	481	0.2	3.25	0.45	0.16	0.042	2.47	...	0.23	...	...	4.04	255	Graphite flakes and patches. Pearlite and free cementite.
297	481	0.1	3.30	.44	.16	.041	2.47	...	.16	...	...	4.09	225	Graphite flakes, and patches. Pearlite and free cementite.
MAGNESIUM OXIDE														
217	I	0.5	3.52	0.47	0.16	0.013	1.95	...	...	...	Trace	4.15	180	Graphite flakes, isolated patches resembling irregular shaped nodules, pearlite, some ferrite.
218	I	.5	3.58	.47	.15	.011	2.21	...	...	...	Trace	4.29	150	Graphite flakes, isolated patches resembling irregular shaped nodules, pearlite, some ferrite.
219	I	.5	3.73	.47	.14	.011	1.65	...	...	...	Trace	4.27	...	Graphite flakes, isolated patches resembling irregular shaped nodules, pearlite, some ferrite.
258B	I	.5	4.01	.22	.15	.014	1.09	0.11	...	..	Trace	4.38	...	Graphite flakes, isolated patches resembling irregular shaped nodules, pearlite, some ferrite.
260	I	.5	3.84	.23	.15	.013	1.19	0.05	...	...	Trace	4.24	155	Graphite flakes, isolated patches resembling irregular shaped nodules, pearlite, some ferrite.
CALCIUM														
289	I	0.4	3.70	0.41	0.16	0.011	2.08	...	...	0.011	...	4.37	150	Flakes, pearlite and ferrite.
292	Wash Metal	.5	2.97	.54	.28	.089	2.88	...	...	.02	...	3.92	200	Flakes, pearlite and ferrite.
313	I	.4	3.62	.50	.15	.01	2.69	1.1	...	.008	...	4.47	150	Flakes, irregular patches, pearlite and ferrite.
329	Q	1.5	2.42	...	...	.005	4.70	4.02	...	.021	...	3.83	275	Flakes, some nodules.
316	I	1.0	3.19	...	...	...	2.61	3.2	...	.011	...	3.98	185	Flakes, pearlite, some ferrite.
330	Wash Metal	1.0	3.14	.17	.28	.044	1.52	...	...	.018	...	3.68	225	Flakes, patches resembling nodules. Fine pearlite, some steadite.

* Percent by weight of total charge.
1. Carbon equivalent was calculated by formula: % C + 0.3 (% Si + % P).

Five Steps to

JOB IMPROVEMENT

1. Pick a job

a. One that is worth improving

b. One that is giving trouble, because

1. It is a bottleneck
2. It takes too much time
3. It requires chasing around for material, tools, supplies, etc.
4. Costs are too high

2. Observe the job

a. Break down the job into its details or elements

b. Write down on paper the details or elements

3. Think: Question every detail or element

a. Why is it necessary? What is its purpose?

b. Where should it be done?

c. Who is best qualified to do it?

d. When should it be done?

e. How can it be done a better way?

f. Question product design, material, etc.

4. Decide: Work out the new method.

a. Eliminate unnecessary details.

b. Combine elements where practical.

c. Rearrange elements for better sequence.

d. Simplify details or elements.

e. Look for waste and bottlenecks.

f. Discuss your ideas with others, and ask questions.

g. Write up your suggestions.

5. Act: Sell the new method and apply it

a. Sell it to the boss.

b. Sell it to all others concerned.

c. Get final approval

d. Put the new method into effect until a better way is developed.

e. Give credit to others where credit is due.

f. Don't forget, a change of method means a change of standard or piece price; otherwise the savings on your new method are lost and will also result in a loose rate.

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Mahwah, N. J.

WORK

THE principles of work simplification are not new. The fact that these principles have been known and applied in industry in the last half century, and especially here in the United States, is documented by the vast and rapid growth of our industrial age, and the ever increasing standard of living we enjoy.

As a simple but fundamental example of this, we can point to the steel industry. Years ago, when the mills first started rolling strip and plate, it was natural to use only two rolls. These heavy and ponderous rolls and their driving mechanism had to be stopped, then reversed, after each pass of the billet or strip, to roll it back again. This had to be done when time was at a premium in order to work the steel while it was within the workable temperature range. Production was slow and costly, and it was impossible to make the smaller sizes and thinner sections by this method because of the time and temperature factors.

Then someone got the bright idea (work simplification, if you will) of adding a third roll so the strip could be fed back through the rolls by the simple expedient of running it back under the middle roll. Production was stepped up tremendously, and the range of strip that could be produced by the new method was broadened considerably.

It is a far cry today from the old type mill with three rolls and hot strip to the present continuous mills and cold rolling. But every step of the way has, no doubt, been made possible in some degree by the greater production, the lower costs (and consequent greater profits) and the wider variety of work that could be produced by the simple addition of that third roll to the original two-roll mill.

This is a concrete example of work simplification.

However, the term "work simplification" as it is used today, implies something more than just the principles involved. It embodies not only the principles themselves, but a methodical and rational approach to the problem of applying those principles, which can be practiced universally. And by that I mean by everybody in your plant (or office) from the sweeper to the company president.

Many plants and many companies have tried or are trying suggestion systems with varying degrees of success. Reasons for failure are many—poor administration; niggardly awards; lack of publicity; apathy on the part of employees; and just plain downright

Present day conditions make it more imperative than ever before to improve the efficiency of manufacturing operations. How work simplification can help accomplish this is discussed by the author in a paper presented before the 15th annual Wisconsin Regional Foundry Conference

K SIMPLIFICATION

poor labor or human relations.

But there is one other cause for failure of suggestion systems. We are asking the fellow in the shop to do a job and we are not giving him the proper tool to do it—and that is work simplification. And here again I mean not only the principles, but the method of approach and analysis as well.

Ideally then, carrying work simplification to the ultimate would mean training everybody in the plant to use the principles *and* the method of analysis, and tying this in with an adequate, fair, and rewarding suggestion system.

Much could be done for labor relations under such a program. However, we must be realistic. We must learn to crawl before we can walk. The idea of training in work simplification for everybody is still too

FLOW CHART **Symbols and Definitions**	There can be two types of flow charts. 1. The MATERIAL type which presents the process, or flow, in terms of the events which occur to the material. 2. The MAN type which presents the process in terms of the activities of the man.
OPERATIONS *Symbol:* ○	An operation occurs when an object is intentionally changed in any of its physical or chemical characteristics, is assembled or disassembled from another object, or is arranged or prepared for another operation, transportation, inspection or storage. An operation also occurs when informaton is given or received or when planning or calculating takes place.
TRANSPORTATION *Symbol:* ⇨	A transportation occurs when an object is moved from one place to another, except when such movements are a part of the operation or are caused by the operator at the work station during an operation or an inspection in a material type flow chart.
INSPECTION *Symbol:* □	An inspection occurs when an object is examined for identification or is verified for quality or quantity in any of its characteristics.
DELAY *Symbol:* D	A delay occurs to an object or a man when conditions except an operation, transportation, inspection or planned storage, do not permit or require immediate performance of the next step in the process.
STORAGE *Symbol:* ▽	A storage occurs when an object is kept and protected against unauthorized removal (planned storage).

When unusual situations outside the range of the definitions are encountered, the intent of the definitions summarized in the tabulation to the right will enable the analyst to make the proper classifications.

CLASSIFICATION	PREDOMINANT RESULT
Operation	Produces or Accomplishes
Transportation	Moves
Inspection	Verifies
Delay	Interferes
Storage	Keeps

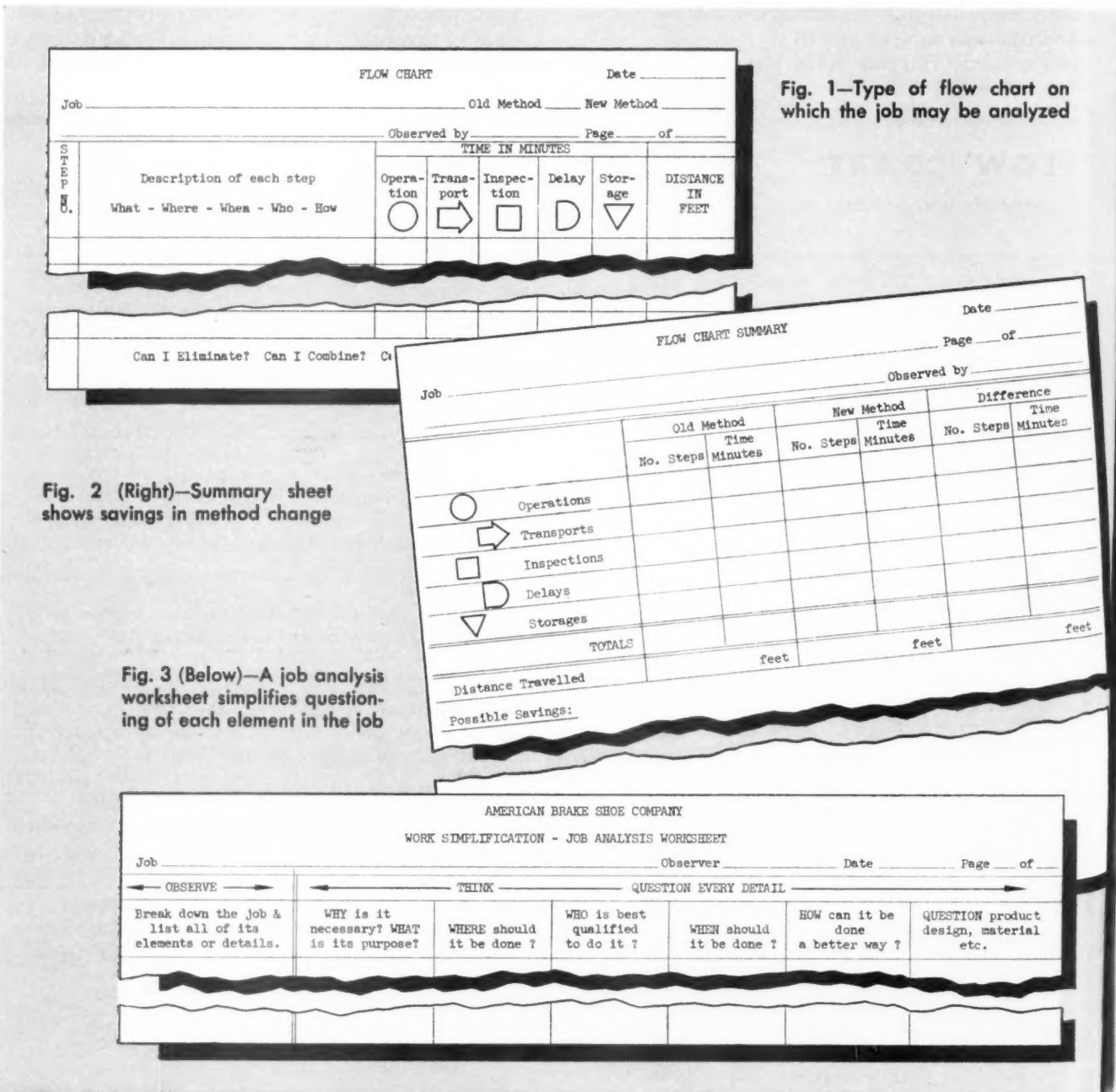
radical a step, and must await a time in the future when the labor-management team really functions as a team.

To be practical, then, we must aim our program at the supervisor. He, as an integral part of management and a person above average in intelligence and ambition, and in direct contact with actual shop practices and conditions, is the logical man to train in work simplification. Consequently, these remarks and the forms and examples shown here are presented from the standpoint of putting on a foreman training program on the subject.

We have done this in several plants in our company. We intend to do a lot more. We still have a lot to learn, and we hope to improve and make the program more effective each time we do it. But we have already learned a lot about what to do and what not to do.

But why is work simplification so important at this time, and why is it being stressed more and more by industry today? First, with the increasing pressure of governmental controls, both price-wise and material-wise, and the constantly increasing inflationary pressures of wages, material costs and taxes, the "take-home" profit margin is certain to shrink. The only way left to combat the trend is in improved methods and increased productive efficiency—for which there is no better answer than work simplification.

Second, many plants and companies have already installed incentive programs wherever possible and have realized all the benefits they can from such installations. Now it becomes imperative—to meet the shrinking profit margin—that they go back over the same ground and dig out the additional savings which can be realized by improved methods which were not


FLOW CHART

Date

Job _____ Old Method _____ New Method _____

Observed by _____ Page ____ of ____

STEP No.	Description of each step What - Where - When - Who - How	TIME IN MINUTES Operation ○	Transport ⇨	Inspection □	Delay D	Storage ▽	DISTANCE IN FEET
	Can I Eliminate? Can I Combine? C						

FLOW CHART SUMMARY

Date

Job _____ Page ____ of ____

Observed by _____

	Old Method No. Steps	Old Method Time Minutes	New Method No. Steps	New Method Time Minutes	Difference No. Steps	Difference Time Minutes
○ Operations						
⇨ Transports						
□ Inspections						
D Delays						
▽ Storages						
TOTALS						
Distance Travelled		feet		feet		feet
Possible Savings:						

AMERICAN BRAKE SHOE COMPANY

WORK SIMPLIFICATION - JOB ANALYSIS WORKSHEET

Job _____ Observer _____ Date _____ Page ____ of ____

← OBSERVE →	← THINK — QUESTION EVERY DETAIL →					
Break down the job & list all of its elements or details.	WHY is it necessary? WHAT is its purpose?	WHERE should it be done ?	WHO is best qualified to do it ?	WHEN should it be done ?	HOW can it be done a better way ?	QUESTION product design, material etc.

Fig. 1—Type of flow chart on which the job may be analyzed

Fig. 2 (Right)—Summary sheet shows savings in method change

Fig. 3 (Below)—A job analysis worksheet simplifies questioning of each element in the job

obtained in the hurry and pressure of making the original incentive installations.

Third, some plants and companies, with the labor situation they face today, cannot make incentive installations. To these, work simplification and methods improvement is the obvious answer.

And fourth, but not least, from a broad point of view, if America is going to remain strong, and have both guns and butter, combating inflation and affording a constantly rising standard of living for everyone, production and more production is the answer. Work simplification can help materially to accomplish this objective.

Methods and job improvement can be done without expensive outlays for mechanization and capital equipment. The sum total of all the small savings that can be made in your present plant setup, without extensive or expensive changes in physical layout or equipment, can far outweigh the savings that might accrue from a major mechanization program.

Work simplification can be practiced by anyone. There are experts who can look a situation over and come up with the right answers to make savings and reduce costs almost immediately. Such experts are few and far between, and they come high. With work simplification, if the proper approach and method of analysis is used, anyone of average intelligence can come up with the answer for a better way to do a job.

The proper approach and method of analysis involves the mere following, one step at a time, of the five fundamental steps to job improvement. These are outlined on the first (*Please turn to page* 205)

STANDARDIZING THE JOB Date

Job Observed by

Page 1

Materials	Explanation of Remarks
Can cheaper materials be used? If so, what?	
Is the material of proper size to keep the amount of waste, scrap, short ends, etc. to a minimum?	
Is the material uniform, and in suitable condition for use when brought to the operator?	
Does the operator use this material to the best advantage during the process?	
Can some use be found for scrap or rejected parts?	
Materials Handling	
Can the distance material is moved be shortened?	
Can the number of times material is handled be reduced?	
Is the material received, moved and stored in suitable containers?	
Does the volume of material flow justify a conveyor or other means of transportation?	
Will a rearrangement of the layout or combining of operations make it unnecessary to move the material?	
Can backtracking be reduced or eliminated?	
Tools, Jigs and Fixtures	
Are the tools the best for the job?	
Are tools kept in good condition?	
Does the operator have trouble setting the work in the jig or fixture? In setting certain cores, etc.?	
Are tools and material arranged within the normal work area and conveniently at the workplace?	
Can tools or fixtures be changed to require less skill in performing the operation?	

Remarks:

STANDARDIZING THE JOB Date

Job Observed by

Page 2

Machine	Explanation and Remarks
Are drawings, tools, patterns, cores and other job accessories brought to the workplace without delay?	
Is the machine properly set up?	
Does the operator make his own set-up? If so is it on incentive when the job is on incentive?	
Are there delays in the inspection of the first piece produced?	
Can the number of set-ups be reduced by proper lot sizes or better scheduling?	
Operation	
Is the operation necessary? Can it be eliminated?	
Can two or more operations be combined into one?	
Can the work be done in multiple?	
Can the machine speed or feed be increased?	
Could a jig or fixture be used to advantage?	
If a hand job can it be put on a machine to make it more economically?	
Operator	
Is the operator qualified to do the job?	
Can unnecessary fatigue be eliminated by changing tools, fixtures or layout?	
Is the supervision satisfactory?	
Can the operator's performance be improved by further instruction?	
Working Conditions?	
Are the light, heat, ventilation satisfactory?	
Are there any unnecessary hazards on the job?	
Can a chair or stool be used to perform the job more efficiently? With less fatigue?	
Is good housekeeping maintained in the department and around the workplace at all times?	

Remarks:

Figs. 4-5—Another type of worksheet used to focus a questioning attitude on the job

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Gates and Heads FOR STEEL CASTINGS

How to employ padding and metal chills in the interest of obtaining directional solidification of steel castings is described in this sixth and concluding article

SIMPLEST and most effective method to obtain directional solidification is to pad the sections so that they taper strongly from the bottom upward. This practice has been used for a number of years, but until recently there was no definite information as to the amount of padding that should be applied to sections of varying thickness, in order to make them completely solid. Duma and Brinson's experiments have furnished the necessary data which are summarized in Fig. 36 (FOUNDRY, March, p. 115) taken from their paper. From this chart, it is possible to calculate the amount of padding required for sections of different thicknesses and heights. As might be expected, thin sections must be padded much more heavily than thick ones.

A 1-in.-thick piece 8-in. high, for instance, requires 0.20-in. per inch, or $0.20 \times 8 = 1.60$-in. of padding, while a 2-in.-thick section of the same height need be padded only 0.102-in. per inch, or $0.102 \times 8 = 0.816$-in. Up to a height of 12-in., the required amount of padding per inch increases steadily for all thicknesses of metal, but in the thinner sections, less padding per inch of height is required when the piece is over 12-in. high. Apparently this is because the pressure of gravity from the metal in the heads becomes great enough, as the height is increased, to force *feed metal* into the space between the ends of the dendrites more effectively than when the height is small and the pressure due to gravity correspondingly low.

Since the angle at which the section lies has but little effect upon the extent of the center-line shrinkage formed in it, shapes such as hollow cylinders or castings of polygonal outline, like those shown in Figs. 37 and 38, from Duma and Brinson's paper, require padding to the same extent as do striaght sections. The side walls of steam turbine casings are almost invariably padded in the way illustrated in Fig. 39.

The disadvantage of padding thin sections in this manner to eliminate center-line shrinkage, is that it is often impossible to leave the pads in place, so they must be machined or burned off. Since oxy-gas cutting torches were not used in steel foundries at that time, and it is often impossible to remove padding with machine tools, the author made no mention of this method in his 1914 AFS paper. Indeed, until radiography was adopted generally, the existence of center-line unsoundness, or at least the extent to which it occurs, was not generally realized. It is not surprising, therefore, that for many years it did not occur to steel foundrymen to use this method of promoting progressive solidification of castings from the bottom upward.

The expense of machining or burning off metal added as padding considerably increases the cost of producing castings. This is especially true of some of the alloy steels now used in steam turbine casings and similar articles, which are quite "tender" and can be safely subjected to extensive burning operations only when kept at a temperature of several hundred degrees. To preheat these pieces, keep them hot while the burning is carried out, and return them

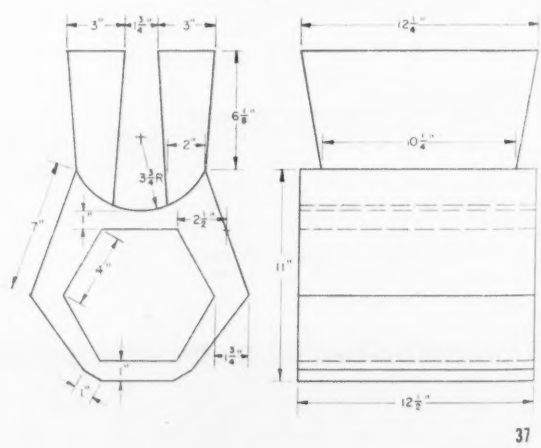


Fig. 37—Sketch of hexagon showing padding and risers. (Brinson and Duma, *Transactions*, AFS, 1942)

to the furnaces so that they will cool uniformly, is a time-consuming and expensive operation. To secure castings that will not leak steam in high-pressure, high-temperature service, however, it is necessary to eliminate center-line shrinkage as well as any other unsoundness, and padding is the only practicable means of doing so. Castings with comparatively thin walls that must resist penetration by projectiles, should also be free from this class of defect, and usually can be made properly solid only by the generous use of padding.

On the other hand, in a great many castings center-line shrinkage at one or more points can be eliminated only at a cost out of all proportion to the harmful effects of the defect. In the discussion of Duma and Brinson's paper, a number of authorities pointed out that thousands of structural castings undoubtedly contain central shrinkage areas, yet give perfectly satisfactory service. One instance cited was freight car side frames and bolsters, in which there are many thin sections with parallel walls, which are inevitably more or less unsound, yet endure very severe stresses in service, and seldom fail.

It was argued that when the unsound section is so stressed that one side is in tension and the other in compression, the central axis is under no stress whatever, and hence center-line shrinkage is of no consequence. Unfortunately, this argument does not hold true in the numerous cases in which the unsound section is stressed as a beam on edge. Under these conditions, a section containing serious center-line shrinkage areas really acts like two pieces of plate on edge, tied together by the sounder metal between the cavities. Centerline unsoundness can hardly fail to weaken a section stressed in this manner.

As a matter of fact, the difficulty, if not impossibility, of making thin sections of cast steel with parallel walls truly sound is one of the chief reasons why many machinery manufacturers have turned to the use of cast-welded assemblies, in which rolled plate is substituted for the parts of the finished article that cannot be cast really solid. This type of construction, which will be discussed at some length in a subsequent chapter, often enables the designer to save a great deal of weight in machine parts, and at the same time be sure that they are stronger than if they were made as integral castings.

Since all that is required to eliminate center-line shrinkage is to produce directional solidification from below upward, it is not essential that the padding be an integral part of the casting. The extra metal is nearly, if not quite, as effective if it is simply a tapering mass of hot steel in close proximity to the casting, but separated from it by a thin layer of sand. In numerous cases, therefore, it is possible to make a great saving in the cost of removing the pad by placing a thin core between it and the casting proper, so shaped that the pad and the casting are united only at the top. This construction is especially useful when a top-attached head is thicker than the casting below it, and padding is considered necessary to promote effective feeding.

As shown in Fig. 44, a pad of this sort is removed from the casting by the same torch cut that severs the head. In using such a pad, a small opening should be provided at the bottom through which the steel may enter the pad from below, so that the casting and the pad are filled at the same time. If this is not done, the pressure of the steel in the casting bends the core outward and sometimes even breaks it, before the steel can flow over the top of the core and enter the pad.

It costs a good deal less to make and set the required core than it would to burn off integral padding, and the surface of the casting under the core is generally much smoother than that left by the torch. When the casting is made of one of the "tender" alloy steels that can be safely burned only when heated, the advantage of using the core is even greater.

In the last few years this principle has been ex-

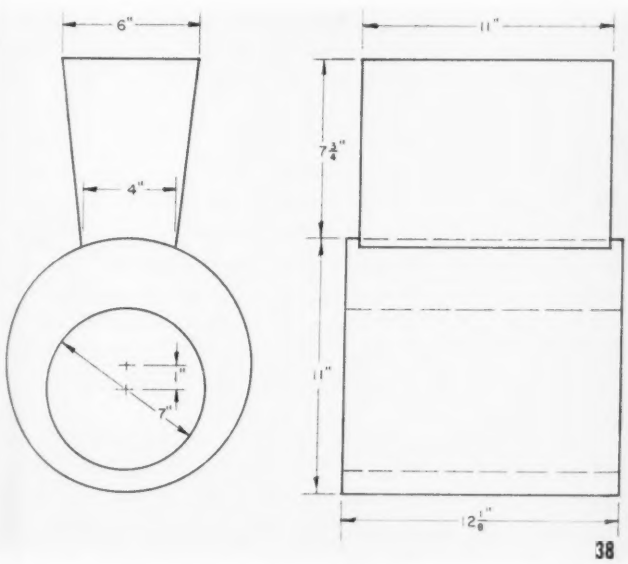


Fig. 38—Sketch of cylinder, padded, showing risers. (Brinson and Duma, *Transactions*, AFS, 1942)

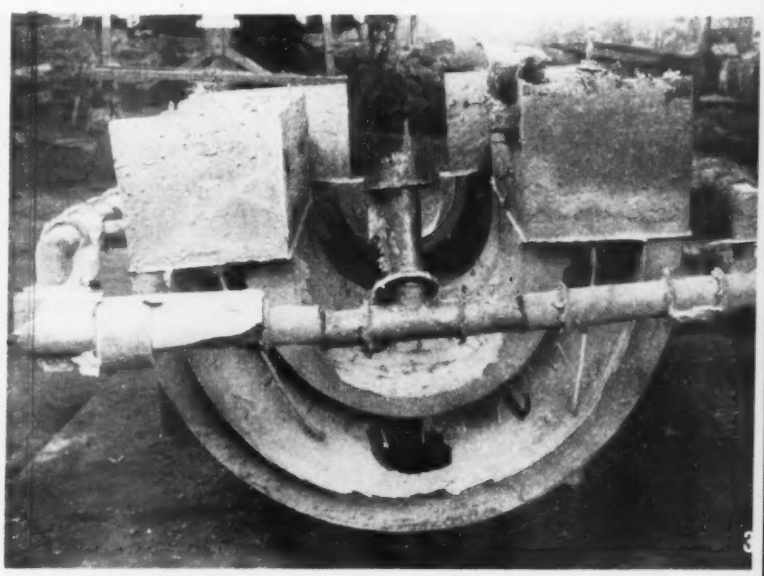


Fig. 39—Position of gates and risers on turbine casing. (Briggs, *Metallurgy of Steel Castings*)

tensively employed to promote directional solidification by delaying the freezing of suitably located parts of castings. The hubs of wheels and gear blanks, for instance, may be kept liquid at the top by extra metal in the bores attached to superimposed heads, but separated from the casting by annular cores. The expensive job of machining out integral padding in a boring mill is thus eliminated, at a fraction of the cost of the machine operation.

The author was one of the first to point out[26] the advantages of using metal chills set in the sand of molds or cores, and so located as to hasten the solidification of the lower parts of a casting, thus permitting the slower-cooling upper portions and the sink-head to feed the piece more effectively. In 1914, however, this idea encountered considerable skepticism, and several of those who discussed the author's paper stated flatly that external chills should never under any circumstances be used in a mold intended for steel castings. In the years that have elapsed, however, the advantages of using chills have been better understood, and they are today quite generally applied in steel casting practice.

Chills Not Complete Answer

The author pointed out in 1914, as mentioned previously, that there are cases in which a chill will not be effective, because if used at all it has to be placed where the first steel to enter the mold runs over it. The first-poured metal is thereby made cooler than that which runs later, after the chill has been heated up and has largely lost its chilling power. The result is to make the steel in the top of the casting cooler than that in its lower portions, and thus create conditions that are exactly the opposite of what the chills are intended to produce. In general, therefore, chills should not be used close to bottom gates, and if it is impossible to so locate the gate so that it will not discharge metal directly over the chills, they had better be omitted.

Chills are extensively employed, not only to promote directional solidification of the casting as a whole, but to hasten the cooling of isolated parts of the piece that are heavier than adjoining portions, and therefore form "hot spots" that solidify late and tend to be hollow. The junctions of regular sections, forming tees, angles, crosses and Y's create hot spots of this sort, and when it is not possible to core them out or place sink-heads on them, chills are commonly employed to hasten the solidification of the steel at these points. Several investigators[27, 28, 29] have discussed the design of chills for this purpose, and their findings are summarized in Briggs *Metallurgy of Steel Castings,* (pages 229 etc seq.)

Fig. 40 from Briggs gives the dimensions and locations of chills that are found to eliminate shrinkage cavities in angles and tees. Crosses and Y's are another story, since it has been found next to impossible to make them solid by means of external chills alone. As Briggs points out, and as is discussed by McKee, when the chill is made so large that it covers the thinner metal away from the actual hot spot, its effectiveness is reduced because it makes the thin parts freeze too soon, and therefore the shrinkage of the intersection itself fails to feed as was expected.

In many cases it is possible to redesign a casting to eliminate crosses, by moving one of the intersecting members a short distance, so that two tees are substituted for a single cross, as indicated in Fig. 43. Plain angles are often reinforced at intervals by cross-members, as shown in Fig. 41. A two-way junction is thereby converted into a three-way one, and the tendency for a hollow to form at these points is naturally much greater than in the case of a plain angle. Cores so located as to form openings in the cross-members should be used, as shown in the figure, to eliminate the three-way junctions.

Exterior chills set in molds or cores to hasten the solidification of hot spots of this type must be made up of a number of short pieces, because the expansion of long chills would make them buckle and move out of their proper place. To hold them in position in the sand, nails may be welded to them as illustrated in Fig. 42. In placing chills of this type, care should be taken not to form thin tongues of sand at the points marked *A-A*, which inevitably spall off when the mold is poured, if not before.

If short chills used in this way were set in contact with each other at their ends, their expansion would force some of them out of position. A space filled with sand must therefore be left between adjacent chills, and the steel of the casting in contact with this sand necessarily cools more slowly than that which lies aginst the chills. A series of hot spots is thus set up in a section in contact with a number of chills. Longitudinal contraction of the steel whose cooling is hastened by the chills often causes transverse hot tears in the steel lying between the ends of adjacent chills. To cut brackets in the sand between the chills does not prevent the formation of these tears, since they lie in the same plane as the bracket.

Make Special Chills of Bar Iron

Chills made of bar iron can often be bent by the blacksmith to fit into spaces of irregular outline. However, there are always places that must be chilled but are so shaped that bar chils cannot be bent to fit them. In such cases, a pattern of some sort is made to conform to the outline of the place in question, and a steel chill is made from the pattern.

Besides their function of making intersections solid, chills serve the further purpose of preventing the formation of longitudinal hot tears at these points. These tears are due to the contraction of the two intersecting sections, which solidify earlier than the actual junction does if it is not chilled, and thereby bring stress upon the metal there while it is still hot and weak. As indicated previously, however, the chills may prevent longitudinal tears from forming, but cause transverse ones at the ends of the individual pieces of chill.

This difficulty is more apt to be encountered when the chills are very heavy, so that they cool the casting too fast. If the chills are used only to prevent the formation of tears, therefore, it is sometimes better to use quite light ones, which will serve to set the extreme outer skin of the casting, but will not cool the metal with which they (*Please turn to page* 255)

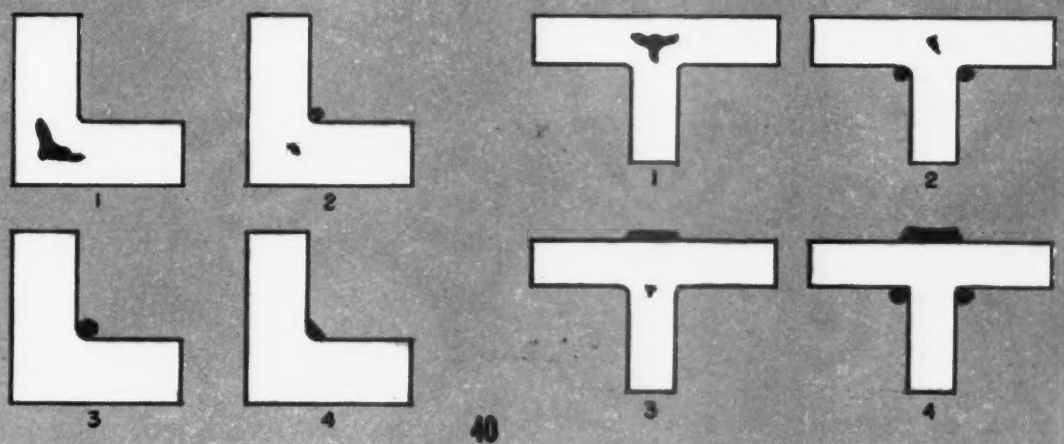
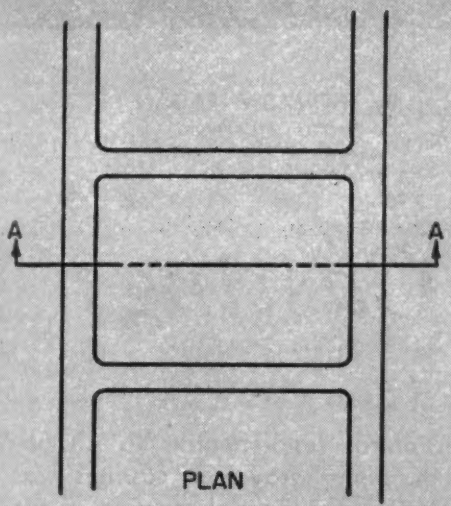


Fig. 40—(Left): External chill, L-sections. (1) Defect, 2.8 sq in. (2) ½-in. D chill, effective perimeter 0.25-in., defect 0.1-in. (3) 1-in. D chill, effective perimeter 0.78-in. (4) Triangular chill, effective perimeter 1.87 in. (Right): External chill, T-sections. (1) Defect, 3.6 sq in. (2) 1-in. D chills, effective perimeter 1.56 in., defect 0.8 sq in. (3) 1-in. plate chill, effective perimeter 4.0 in., defect 0.6-in. (4) 1-in. D chills plus 1-in. chill plate, effective perimeter 5.56 in. (Briggs, *Metallurgy of Steel Castings*)



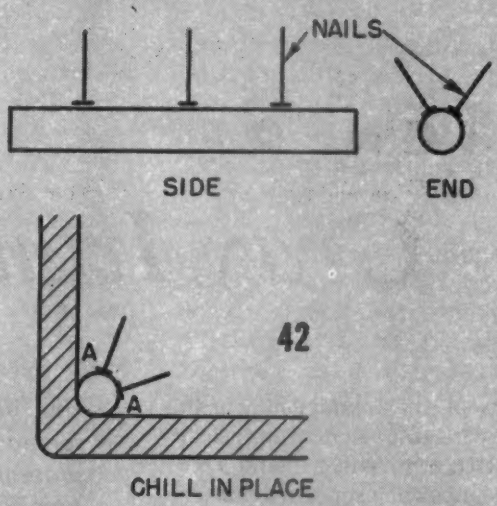


Fig. 42—Nails welded to the chills hold them in place

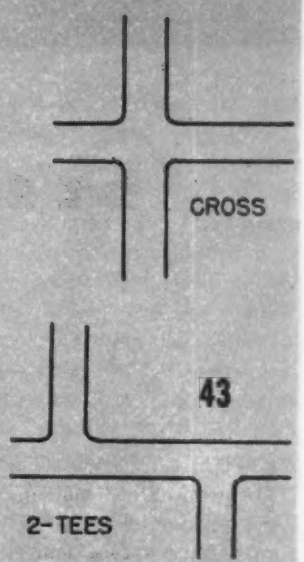


Fig. 43—Moving one intersecting member eliminates cross

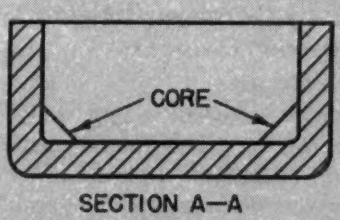


Fig. 41—Cored openings eliminate a three-way junction

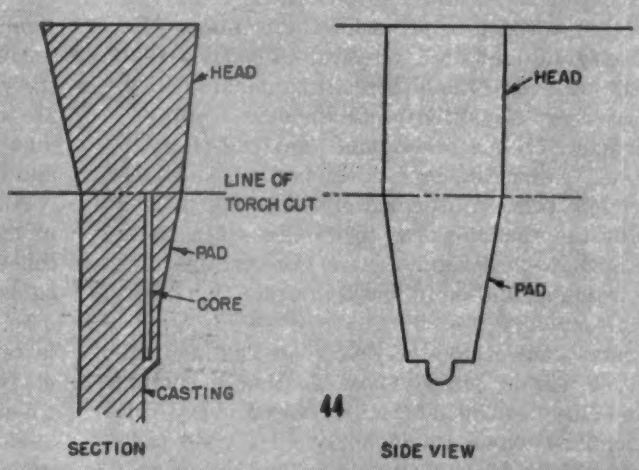


Fig. 44—Heater pad showing the core and bottom opening

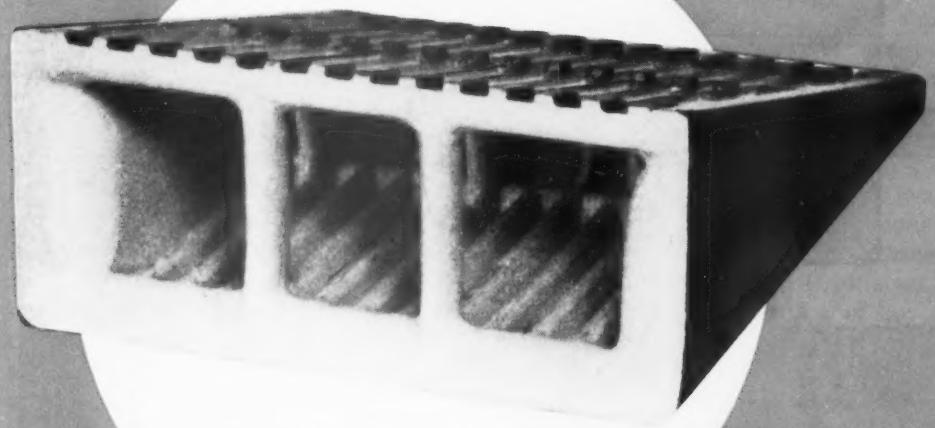


Fig. 1—Wooden model of a complicated casting assists in deciding on molding methods to be employed

Fig. 2—Proper use of fillets and tap

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DESIGN OF *Gray Iron Castings*

This discussion of fundamentals to be observed in designing gray iron castings was presented before the annual meeting of the American Society of Mechanical Engineers, Atlantic City, N. J., Nov. 25-30, 1951, and was contributed by the society's Metals Engineering Division

THE fundamental aim of the foundryman is to produce a casting, with the desired physical properties, which is true to pattern and free from defects. The desired physical properties can be obtained by control of melting and molding procedures by the foundryman. It is not recommended, therefore, that the designer of the casting specify such things as chemical analysis, pouring temperatures, melting charges, and the like, as he usually is not in the best position to prescribe these things. He should specify the required physical properties that are needed, such as tensile strength, machinability, wear resistance, or any other requirement.

The designer, on the other hand, has the right to demand that his casting be true to pattern and free of injurious defects. Unfortunately, it is not always possible for the foundry man to do this when he is burdened with poor design. There are certain rules of design which should be followed in order to achieve the desired results.

These rules controlling the design of castings are not infallible. It is entirely possible that a casting design could be developed which followed every rule ever propounded which would not yield a good casting. Therefore, the very first rule is for the designer to consult frequently with the foundryman as he designs a given casting. It is surprising what can be accomplished by doing so. The foundryman knows the problems he will encounter in the foundry which are not obvious to the designer. Considerable savings in cost usually can be made by following this approach.

Also, it must be remembered that the old-time molder is an artisan who is proud of his ability to cast any design of casting no matter how complicated or how poorly designed. There are innumerable cases where a great amount of unnecessary work is required which can be attributed to this cause. A classical example of this is the casting of a cup and saucer with the spoon in the cup.[1]

Modern foundry practice requires that the art of molding be changed to the science of molding in order efficiently and economically to produce castings. How-

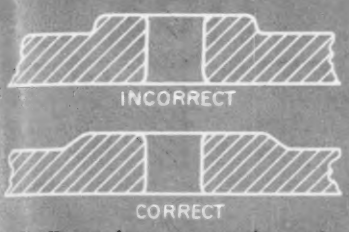


Fig. 3—Taper bosses or pads gradually into body of casting to avoid hot spots

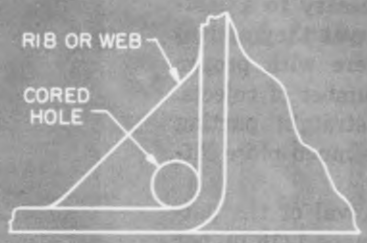
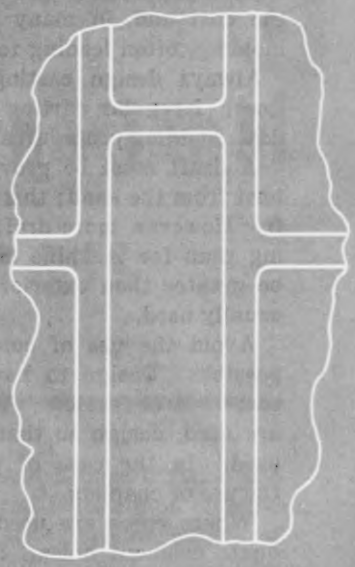


Fig. 4—Cored opening in web or rib helps prevent concentration of metal



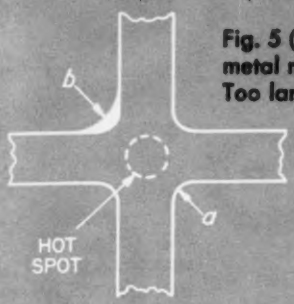


Fig. 5 (left)—Crossed members increase metal mass at (a), retard cooling there. Too large fillets (b) can aggravate this

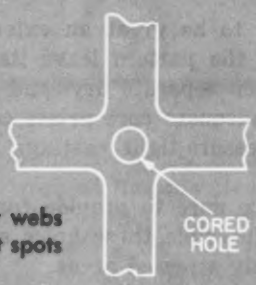


Fig. 6 (right)—Staggering ribs or webs and cored hole use eliminate hot spots

ever, there are numerous foundrymen still at work who are willing to tackle any job. Therefore, it becomes a matter of necessity that designers take heed of this condition and know the foundry and foundrymen with whom he is dealing.

Conversely, the designer should be willing to change his design to conform to good foundry practice so long as its intended functional qualities are not impaired. The very fact that the designer willingly consults with the foundryman precludes much trouble in this respect.

Some of the things which should be checked with the foundryman are:

1. General design of the casting.
2. How the casting is to be molded.
3. Location of the parting line.
4. Accessibility for any enclosed spaces for cleaning.
5. Dimensional limits that must be held.

In cases where a great number of castings of one design are to be made, or where a considerable expense is involved in making the patterns, or where the design is very intricate, it is advisable to have a scale or full-size model made. By doing this many troubles which could be foreseen by no other method can be avoided. An example of such a model is shown in Fig. 1.

Over a period of years a set of general rules which govern good casting design, has been developed and published a number of times.[2] Some of these are quite comprehensive. However, the book *Engineering Properties of Cast Iron*[2] presents an excellent section on design, and it is from this book that the examples shown in Figs. 2 to 11, inclusive, are taken.

Castings should have sections which are not thicker than necessary to meet the required stress imposed on them. This is logical, because the physical properties obtained are based upon the section thickness. On the other hand, the section thickness must not be so thin that the metal will not run through it. This latter condition can best be set by the foundryman who must gate the casting to allow the proper flow of metal.

All sharp angles should be avoided. Use gentle contours wherever possible. Proper radii should be used in all cases. Too large a radius is just as bad as too small a one. In order to avoid stress concentration, the fillet radius should be equal to twice the thickness; however, a fillet radius of 1/3 or ½ the thickness is better for soundness in the castings. Therefore some compromise usually must be made with the foundryman. Some suggestions of what to do are shown in Figs. 2 and 4. Cored openings in webs and ribs (Fig. 4) should be as large as possible consistent with strength and stiffness. Bring together the minimum possible number of sections. A much better practice is to stagger the junctions as shown in Figs. 5 and 6. A cored hole where ribs cross will eliminate hot spots.

Design castings with a uniform section thickness (see Fig. 3). Where this is impossible blend the sections together instead of making abrupt connections as shown in Fig. 2. However, because the inner walls cool more slowly than the outer walls, they should be 70 to 90 per cent of the outer wall thickness, depending upon the intricacy of the pattern.

Always reconsider large complicated castings to see if the same results could be obtained by joining several less complicated sections together.

Ribs should be employed, but only where they will help in reducing the weight or warpage of the casting. Be careful to determine if they interfere with molding. They should have a thickness approximately 80 per cent the casting thickness and should be properly filleted and rounded. Sometimes ribs can be eliminated entirely by designing a bulge in the section instead of a rib. They are effective in compres-

sion, but not so in tension. There is a tendency for designers to add more ribs than necessary to a casting. Many of these do not function, yet they add to the cost and, in many cases, interfere with proper molding, often leading to a greater number of rejects.

Always design castings to have straight parting lines. Irregular parting lines require much more difficult molding procedures.

A draft must be provided for removal of the pattern from the sand; this usually averages 1/16 in. per ft. However, more draft is necessary for hand molding than for machine molding; interior draft should be greater than exterior; in deep draws less draft is usually used.

Avoid the use of cores to as great an extent as possible. Design to have the pattern leave its own core if it is feasible. When separate dry-sand cores are used, design so that adequate core prints can be used. In the case of pressure-tight castings avoid the use of chaplets.

Where cores are used be sure to provide for adequate cleanout holes. If possible these holes should be located out of the highly stressed areas.

Gray iron, like most metals, shrinks when it solidifies. This shrinkage is not uniform for all classes of iron. However, provision must be made for this by the use of shrinkage rules, which for cast iron may be 1/10 to 5/32 in. per ft, depending upon the grade of gray iron and the size of the pattern. The patternmaker will know what shrink rule to use. Typical machine-finish allowances are shown below.

Typical Machine Finish Allowances

(In addition to shrinkage allowance)

Dimension of Casting, in.	Expected Tolerances for As-cast Dimension, in.
up to 8	± 1/16
up to 14	± 3/32
up to 18	± 1/8
up to 24	± 5/32
up to 30	± 3/16
up to 36	± 1/4

The amount of machine-finish allowance varies with the analysis of the metal used, the design of the casting, and its size, the tendency to warp, and the machining methods used. The accompanying table shows typical finish allowances for general gray iron castings. In the case of cylinders, special allowances must be made, and the foundry should be contacted to determine these.

It is desirable that an agreement be made with the producing foundry on the machining allowances required. Then these allowances should be indicated on the drawing. This acts as a guide to the foundryman for the choice of pattern material, methods of molding, and the time at which the pattern needs repair or replacement. In large castings many foundrymen may use certain surfaces as dirt traps which require rather heavy finish allowances. It should be determined if such practice can be tolerated economically.

Permanent-mold, and castings made by other specialized casting processes, require special machining allowances. As these usually have particular requirements, the foundry which is going to make the castings should be contacted.

Most gray iron castings (*Please turn to page* 261)

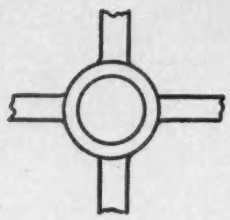


Fig. 7—Circular web with extending ribs is excellent design on large flat plates

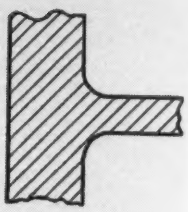


Fig. 8—Avoid use of thin ribs when joining them to a heavier section of a casting

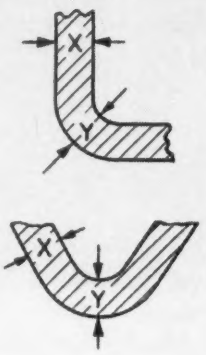
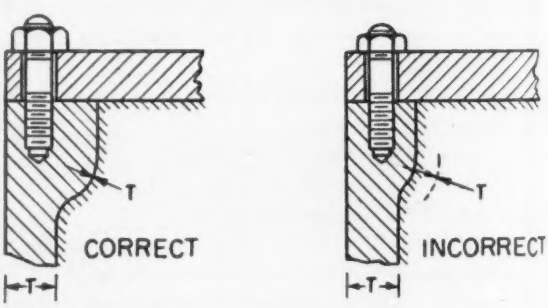


Fig. 9—In unfed L or V sections, provide radii at junctions (y) so that section at this point becomes smaller than the main section (x). Y sections should be provided with a triangular cored hole to reduce the section at the junction



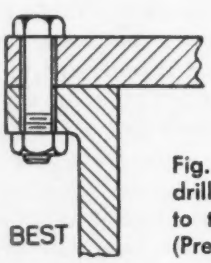


Fig. 10—Wall section adjacent to drilled holes should be equivalent to the main body of the casting. (Pressure applied on shaded side)

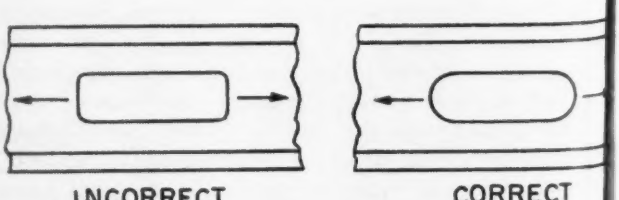


Fig. 11—Use oval-shaped cored holes rather than rectangular shape in ribs or webs; put longest dimension in direction of the stress

Broad Technical Program Scheduled for

AFS International Congress

THE comprehensive program of papers scheduled for presentation at the International Foundry Congress and Show at Atlantic City, May 1-7, indicates that the six days of discussion of foundry technical developments will attract considerable interest on the part of those attending this 56th annual meeting of the American Foundrymen's Society.

As reported previously, the Foundry Show—the other main attraction of the convention—will be a full-scale exhibit, with every foot of available display space expected to be occupied on opening day.

More than 55 formal technical papers have been prepared under sponsorship of the various AFS divisions. Additional discussions will be given at the gray iron and sand shop courses and at the division roundtable luncheon meetings. About 50 of the papers have been preprinted and are being made available to AFS members on request.

In keeping with the international character of this year's congress, a large number of exchange papers from foundry technical groups abroad have been prepared for the Atlantic City meeting. These include papers from England, Belgium, Sweden, Netherlands, France, Australia, Norway, and possibly Italy and Denmark. The paper from the Norway Institute of Technology is by Fredrik Hurum and is entitled "A Study of the Formation of Nodular Graphite." The metallurgical blast cupola will be treated by R. Doat in the Belgian exchange paper. The Institute of British Foundrymen's paper is on "Sand Control with Particular Reference to the Prevention of Scabbing," by W. B. Parkes, British Cast Iron Research Association. "Space, Time and Temperature Relations During Casting of Metals," by J. S. Abcouwer, is title of the Dutch paper.

The extensive program sponsored by the Gray Iron Division will include, in addition to the Belgian and Norwegian papers, discussions on a variety of subjects. Other cupola papers are by W. W. Levi, Lynchburg Foundry Co., Radford, Va., on operation of a basic-lined, water-cooled cupola, and one on "How Iron and Steel Melt in a Cupola" by H. W. Lownie Jr. and C. T. Greenidge, Battelle Memorial Institute, and D. E. Krause, Gray Iron Research Institute. Two papers deal with the fluidity of gray cast iron. One will cover internal porosity in gray iron castings.

Among the papers sponsored by the Aluminum and Magnesium Division is one on "Aluminum Casting Defects — Their Identification, Causes and Cures" by D. L. Lavelle, American Smelting & Refining Co. Other subjects relating to the light metals include "Zinc in Aluminum Casting Alloys," "Investment Casting of Aluminum," "High Strength Non-Heat-treated Aluminum Casting Alloys," "Heat Treatment of Magnesium Alloy Castings" and "Alloying Zirconium to Magnesium."

Two papers to be given at sessions sponsored by the Brass and Bronze Division will cover work at Battelle Memorial Institute on 85-5-5-5 and 81-3-7-9 alloy castings to determine effects of mold materials on leak tightness and mechanical properties, and effects of gating practice on leak tightness.

Malleable sessions will include papers discussing effect of melting furnace atmosphere on metal properties; effect of phosphorus content on graphitization rate and mechanical properties; a test for hot tearing tendency; and how to reduce annealing time.

Among the Steel Division papers will be descriptions of steel desulphurization with injected carbide; substitution of boron for other alloys, and two reports on work at the Naval Research Laboratory. The latter cover hot tearing and use of chills to increase the feeding range of risers.

Refractories will be the topic of four papers, one devoted to basic lining for cupolas. Subjects to be treated in Sand Division papers are varied, including mineral perlite, olivine sand, reclamation by air scrubbing, flowability, and scabbing prevention. Equally broad programs are being arranged to cover the general fields of patternmaking, heat transfer, time study and methods, statistical quality control, plant equipment, safety and hygiene.

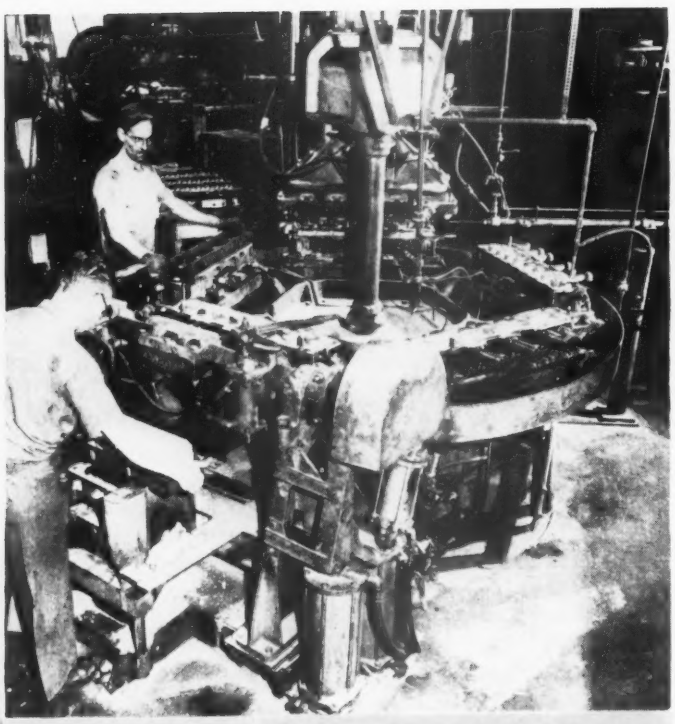
While the Congress and Show is scheduled for seven days, technical sessions will not be held on Sunday, May 4.

Two shop courses will be conducted during the week, and all of the sessions will start at 4 p.m. The Sand Shop Course will cover nonferrous sands Thursday and Friday, with ferrous foundry sands discussed on Monday and Tuesday. The Gray Iron Shop Course also will be held Monday and Tuesday. Technical meetings will be concluded Wednesday with the Steel Division's roundtable luncheon. Other roundtable luncheons are scheduled by the Brass and Bronze, Aluminum and Magnesium, Malleable and Gray Iron divisions.

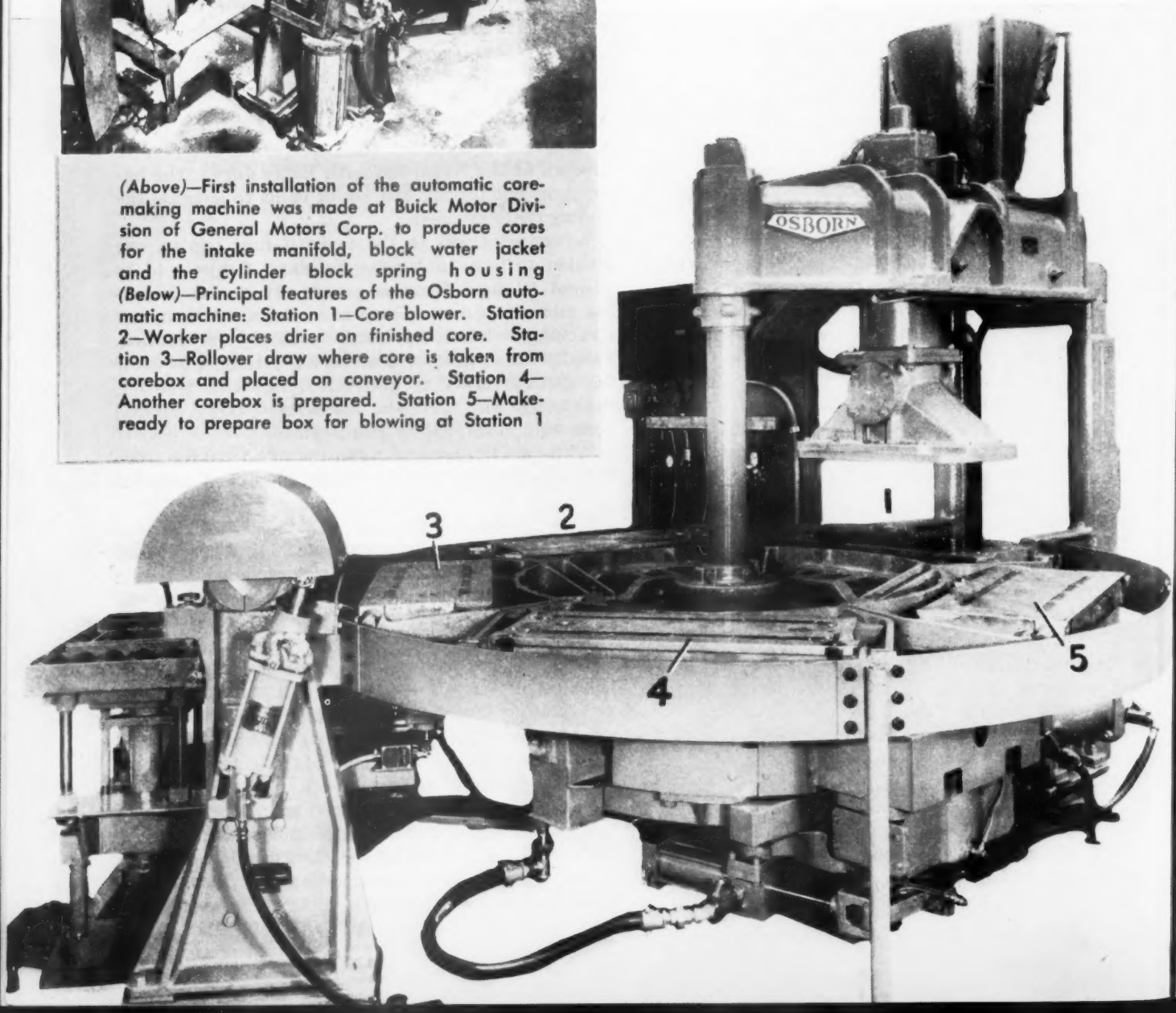
Automatic Indexing Turntable

Speeds Core

By LEON F. MILLER
Vice President, Machine Division
Osborn Mfg. Co., Cleveland



(Above)—First installation of the automatic core-making machine was made at Buick Motor Division of General Motors Corp. to produce cores for the intake manifold, block water jacket and the cylinder block spring housing *(Below)*—Principal features of the Osborn automatic machine: Station 1—Core blower. Station 2—Worker places drier on finished core. Station 3—Rollover draw where core is taken from corebox and placed on conveyor. Station 4—Another corebox is prepared. Station 5—Make-ready to prepare box for blowing at Station 1



reProduction

SUSTAINED high rates of core production have been made possible through the use of a new five-station automatic indexing turntable core production unit known as the Roto-Core Automatic, designed by the Osborn Mfg. Co., Cleveland.

This machine was in the process of development for approximately two years, during which time the first unit was placed in operation in the coreroom of the Buick Motor Division, General Motors Corp. This first unit was operated for several months, running three shifts a considerable part of the time with job changes averaging as much as two per shift.

Production rates in excess of 350 operations per hour have been attained with two men serving the machine. One man places the drier and one man takes the finished core to the drying rack.

The equipment consists of a special core blowing machine and draw mechanism interlocked with a five-station indexing turntable. The entire operation is automatic, providing a predetermined number of operations per hour.

Five stations are provided: Station No. 1, at which the core is blown in the conventional manner; Station No. 2, where the drier is placed and any other operation required prior to drawing the core is performed; Station No. 3, where the corebox is inverted and the core drawn; Stations Nos. 4 and 5, where make-ready operations are performed to prepare the box for blowing at Station No. 1. At these last two stations, loose pieces can be replaced, the box cleaned, and parting agent applied. In most cases, the operations at stations Nos. 4 and 5 can be mechanized to eliminate the need for a worker at either of those stations.

Substantial improvements over the originally estimated production per man-hour were attained by Buick through the mechanization of such operations as venting and removal of loose pieces. These operations are performed by pneumatic pistons attached to the corebox or mounted external to the turntable, depending on conditions. The rigging of the coreboxes in this manner by Buick made it possible to realize to the fullest extent the extremely high production speeds of which this unit is capable.

A floating platen is supported on cradle arms at each of the five stations of the turntable. This design makes it possible to remove the coreboxes from the turntable and replace them with another job without the need for bolting or unbolting. This saves considerable time in changing jobs. If, at any time, a corebox must be removed from the turntable, it can be done without shutting the unit down simply by lifting the platen and corebox in question out of the unit. Properly located limit switches allow the remaining stations to function but prevent the blower from operating when the empty station is at the blowing position.

Movement of the turntable is controlled through a modified Geneva movement which is so designed that the direction of rotation can be changed by reversing the air supply lines to the indexing cylinder. It is also possible to locate the draw machine at either station No. 3 or station No. 4. These two features permit flexibility in arranging the unit to suit local conditions.

Coreboxes of the open type not requiring the drawing of an upper box half can be adapted to the unit even though the cores in each box are different, if sufficient standardization of length and width can be provided to permit a master blow plate to be used. In this manner, five different jobs can be blown each time the turntable makes a revolution. This permits the unit to be used where production requirements do not justify as many as five coreboxes for one core. A more recent development by Osborn is a mechanism that can be added to the turntable that will permit five different coreboxes having upper and lower halves of approximately the same length, but with varying widths, to be handled at one time, with the upper half of each box being drawn prior to the drawing of the core from the lower half.

Since the coreboxes are handled entirely by the machine, the number of cores in a box can be increased to provide still greater increases in production per man-hour. The maximum weight to be lifted is that of the core or cores plus the drier or core plate.

The draw machine automatically inverts the corebox and draws the core, depositing it at a convenient height for removal to the core racks. When loading ovens of the horizontal or vertical continuous type, the speeds of baking and core production are synchronized to make full use of all rack space.

The control system on the machine consists of an electrical timing device controlling solenoid valves which supply compressed air to operate the various mechanisms. The entire system is protected with limit switches, and stop buttons are conveniently located to shut down the unit when required. Additional control buttons permit the turntable, blower or draw machine to operate independently to facilitate set-up and maintenance operations. The timers furnished have circuits in addition to those required for the basic operations of the machine to allow the user to operate box cleaning nozzles, vents, apply parting, etc.

Results to date indicate that this unit has made it possible to increase production up to 600 per cent as well as improve working conditions, permit use of either male or female unskilled labor, and improve quality and uniformity of output.

QUESTIONS and

Remedy for Blows from Inserts

Q.—We are producing a 3.75-lb gray iron casting in which is cast a formed steel channel with a stop-off core pasted in it. The channel is embedded in the casting to a length of 2 in. and weighs 1.25 lb. Starting about two months ago we have had a very high percentage of blows which follow the curve of the channel in most cases. Cores are made with a urea-formaldehyde binder, and baked in a dielectric oven. They are quite permeable and we do not have trouble with them in other castings. Heap sand has a moisture content of 7.2 per cent, permeability of 38, and green strength of 6.8 psi. Facing sand shows 6 per cent moisture, 26 permeability and a 11.9-psi green strength. Composition of the iron is 2.60 per cent Si, 3.50 per cent TC, 0.70 per cent Mn, 0.25 per cent P, and 0.150 per cent S. It seems that this condition occurs almost entirely during cold weather, and it is our feeling that it might be due to a combination of warm sand and cold channels. However, this is the first time that the situation has been so severe.

A.—It is our opinion that the trouble with blows is due to the lack of cleanliness of the inserts. You do not mention how the inserts are prepared prior to placing in the mold, but you can rest assured that the presence of any greasy or oily film, or scale or rust will result in blows with such a small casting. The best procedure would be to sand or shot blast the steel to obtain a really clean surface before placing in the mold. Of course, there is the possibility of the trouble being due to the warm sand and cold steel combination you mention, but you can eliminate that by placing the inserts in the core oven or other warm place to bring them up to room temperature or possibly up to that of the sand, and then set them in the mold. You mention that the stop-off core is pasted on the channel, and it might be that the paste is not dried thoroughly—assuming that the blows show at the joint.

Safety Treads Warp in the Mold

Q.—We are making cast iron stair safety treads with an abrasive coating on the face. The pattern is perfectly straight, but the castings are warped when shaken out. The upper face is concave or, in foundry term, the ends spring up. We shall appreciate information on an iron that can be straightened, a method of casting, or any other solution to our problem.

A.—Under ordinary conditions the usual preventive measure for thin castings that warp in the mold, is to use a warped pattern. In this instance the concave face will be molded in the drag. While the casting is cooling the ends will spring up and result in a straight casting. If you are working with a loose pattern, it can be bent the desired amount by running a few saw cuts across the face and then mounting it on a follow board. If the pattern is metal and part of a matchplate, it cannot be treated in this manner. A new pattern is necessary.

Composition of the iron for stair treads is not an important factor so far as tendency to warpage is concerned. Any ordinary gray iron mixture will serve. Pouring temperature also may be dismissed as a factor. In these thin castings the metal must be poured at a high temperature to properly unite with the abrasive. The same comment applies where it becomes necessary to straighten the warped castings. Castings made from any ordinary gray iron mixture may be straightened by heat and pressure. The casting is raised to a red heat, approximately 1000°F, then placed on a flat plate, convex side up, and either weighted or clamped down until it is cool enough to handle. In extreme cases it may be necessary to place the casting on a slightly curved foundation plate. The tread casting is pressed below a straight line, to compensate for the slight amount of spring when the weight or clamps are removed.

Slag Becomes Thick and Viscous

Q.—We operate a 5000-lb oil-fired rotary brass smelting furnace using charges of miscellaneous brass and copper scrap (solids and turnings) with sand and soda ash or sand and limestone screenings as the flux. For a period of three to four months we obtain a good fluid slag with normal melting loss, and then for some unaccountable reason a period begins where we get very thick lumpy slags (high metallic content), excessive melting losses, and a build-up of dross on the wall of the furnace. This condition occurs with a new lining as well as with an old lining.

A.—We believe your difficulty is due to creation of extremely viscous siliceous slag, and in an effort to thin it out or make it liquid the temperature is increased, resulting in considerable evolution of zinc oxide. Possibly, the incrustation or build-up might be a combination of lead silicate and zinc oxide due to an excess combination of silicon bronze and high-lead bearing brasses in the scrap. The only way to ascertain its nature would be to make slag analyses.

It appears to us in the case of the sand-soda ash flux, that the thinning out could be accomplished by addition of more soda ash, or preferably not to add so much sand. Soda ash in any great excess will combine with silica in the furnace lining and corrode it, resulting in low lining life. In the case of the sand-limestone flux liquefication can be done by

Answers

adding more lime or some fluorspar—or, as previously indicated, by reducing the sand. As in the case of soda ash, excess lime and fluorspar will attack the lining to satisfy their silica needs in forming silicate slags.

We gather that the fluxing materials are added to provide a cover on the molten bath to protect it against the flame, and we believe that use of broken glass alone will provide that.

Oxidizing of Bronze Tablets

Q.—Can you give us any information on a chemical or prepared liquid for use in oxidizing bronze tablets and placques?

A.—Material in general use for obtaining a light brown to almost black color on copper-base alloys is a solution of ammonium polysulphide in water. Color obtained will depend upon dilution and time of immersion. Stronger solutions develop the color more rapidly; however, weaker solutions, while requiring a longer time for developing the color, give better results due to a denser film being formed. Ammonium polysulphide (a liquid) may be obtained from any chemical supply house furnishing materials to laboratories, or from firms selling supplies for electroplating.

Magnesium Loss Spoils Alloy

Q.—We operate a foundry in Spain, and have been experimenting on a laboratory scale with making castings from an aluminum alloy high in magnesium. However, in spite of using a cover on the refractory crucible used for melting, we had a great oxidation of magnesium which rendered the alloy useless.

A.—By your reference to an aluminum alloy high in magnesium, you probably mean that containing 10 per cent Mg and remainder aluminum, and since magnesium in the molten condition combines readily with oxygen, careful attention should be given to melting conditions to hold such loss to a minimum. One precaution to be observed is that which applies to most nonferrous alloys—melt as rapidly as possible, and remove from the furnace as soon as the proper temperature is reached. In the case of the 10 per cent Mg-Al alloy the temperature of the metal in the crucible never should exceed 1400°F. Pouring temperature is in the range 1275°F plus or minus 15° so that at 1400° sufficient superheat is available for handling to the mold side.

Employment of a covering flux usually is advisable, and several proprietary materials are available in this country. You might try a mixture of 70 per cent sodium chloride and 30 per cent calcium chloride, or one composed of 3 per cent calcium fluoride, 4.5 per cent sodium fluoride, 24.5 per cent potassium chloride and 68 per cent magnesium chloride. Latter is mixed together dry, melted and poured into bars or blocks which are crushed and kept in stoppered containers since it absorbs moisture. First-mentioned flux also should be kept dry.

Since the alloy in question in the molten condition tends to react with moisture in sand, moisture should be kept as low as possible; additionally an inhibitor such as boric acid should be added—about 6 to 8 per cent by weight.

Intends To Build Own Cupola

Q.—We must replace our cupola in the very near future, and are going to build it ourselves. The shell will be 50 to 60 in. lined down to 36 in. Any information on the following will be appreciated: Detail as to size of windbox, tuyeres, pipe from fan to cupola, size of fan, height from tuyere to charging door, how blast pipe should enter windbox, how tuyere should be located in windbox, etc. We propose to slag from the back of the cupola and tap approximately 1500 lb each time.

A.—While the idea of making something on your own has certain attractions, it is our opinion that you would eliminate many headaches by purchasing a cupola already fabricated from any of the several

GANGWAY!

By J. A. PATTERSON

"I'm ordering a smaller suit for you next week, Shorty!"

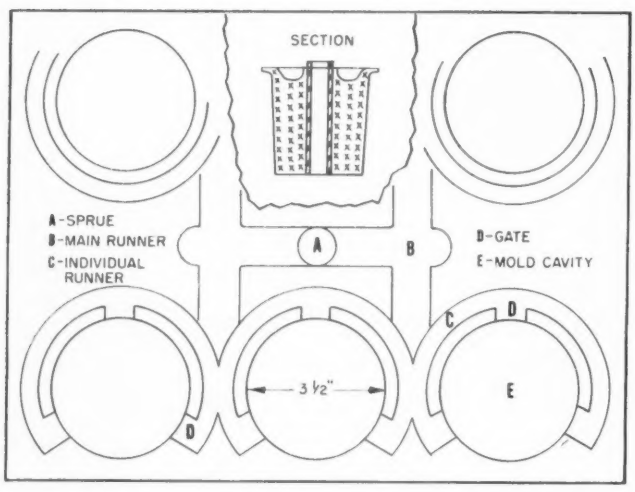
manufacturers. However, if you intend to carry out your plan of constructing it yourself, we suggest that you obtain a copy of the *Handbook of Cupola Operation,* which contains pertinent information on construction and operation of the cupola.

Information on the specific questions asked is as follows. Windbox size—10 to 14 in. wide and 3 to 4 ft high. Number of tuyeres—six, about 4¼ in. high and 7 in. wide. Fan—size to supply at least 2420 cfm at tuyeres and preferably 10 per cent oversize. Height from tuyeres to charging door—12 to 15 ft. Fan entrance to windbox—tangentially. Blast pipe—will depend on diameter of fan outlet, probably 8½ to 10 in. Well depth from sand bottom to bottom of tuyeres—about 20 in.

Gate Is Cause of Shrinkage

Q.—We are forwarding for your inspection a small aluminum hub casting with a steel tube incorporated in the center. We have molded the casting flange side up and flange side down and have gated it at the top near the center, also into the narrow flange, either top or bottom. Some castings are defective irrespective of which method is used. Some are shrunken on top, and some have a small wavy grooved area 1/32 to 1/16 in. deep on the vertical face in front of the gate. The molds are faced with new sand and well vented. The metal is melted with coal.

A.—The small grooved area on the hub casting is caused by shrinkage, and this in turn is the result of pouring the metal through a single small gate. The steel tube in the center acts as a chill and causes the bulk of the metal to set uniformly all the way through, with the exception of the area in front of the small single gate. The metal in this area is the last to set and since the single thin gate cannot supply any more metal, the shrink spot appears. Hence a change must be made to rectify the situation.



Suggested method of gating mold at three places

Two remedies are suggested. 1—Assume you have six castings in a flask 12 x 16 in., three on each side of a central runner as shown in the accompanying sketch. Connect this runner to a circular runner around or nearly around each mold cavity. Cut three gates equally spaced, from the circular runner to the mold. In this way the metal in the casting will be of uniform temperature and will not develop a hot spot at any point. With this proposed arrangement the metal will be distributed rapidly and uniformly over the entire area and thus prevent the formation of hot spots.

2—Pour the metal through a wedge gate on top of each casting. In this case the casting is molded flange side down or, in foundry language, it is all in the cope. The objection to this method is that a deeper cope is required. In the first method the casting may be molded all in the drag, or all in the cope. You may prefer one to the other.

Incidentally, we are wondering how you locate the steel tube accurately in the center. In the casting submitted, it is off center about 0.003-in. Also we are curious to learn why the small shrinkage area should result in rejection of the casting. If the outside face of the hub is machined, the defective area would clean up with the first cut.

Iron Loses Heat Too Quickly

Q.—During the shortage of pig iron we greatly reduced the pig and increased the scrap content of our mix. The iron looks hot coming from the cupola, but cools quickly. We are making thin castings and at times have used ferrosilicon, silicon carbide and graphite briquets, and have desulphurized with soda ash. However, none of these has given us entire satisfaction. We are wondering whether you could recommend the best possible additions to use in the cupola mix with 10 to 20 per cent pig iron containing about 2 per cent Si, and the remainder scrap.

A.—Since there is now a considerable easing in the pig iron situation, you should be able to increase the quantity of pig in your mix, but it would be our guess that merely increasing the amount of pig will not cure your trouble entirely. We suspect that a large part of your difficulty may be in faulty cupola operation, type of scrap used, etc. One thing we suggest you look into is the height of the bed above the tuyeres, and see that it is from 48 to 50 in. Possibly you are using a considerable amount of dirty and rusty scrap, and it will be wise to eliminate that or hold it down to a minimum amount.

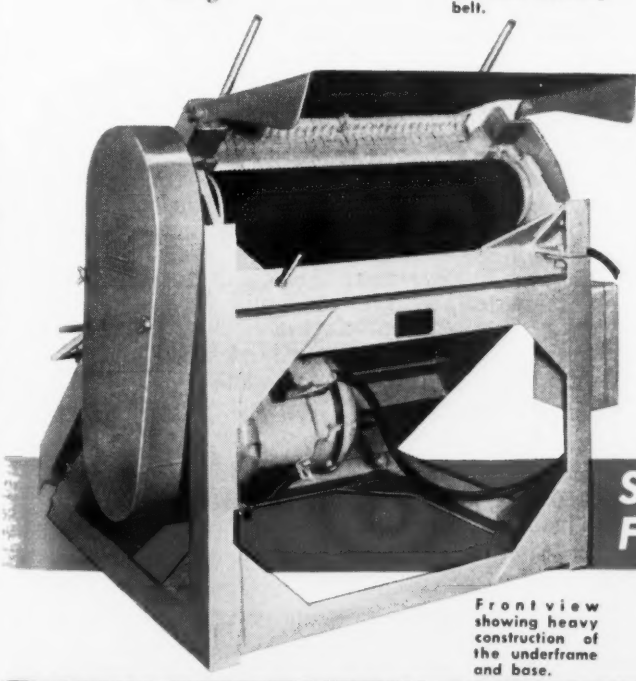
It may be that the scrap you are using is so constituted or of such shape that it results in an "open" charge rather than a more or less dense or solid one. Such charges tend to oxidize more rapidly in melting and often produce iron similar to what you describe as "hot over the spout and cool quickly." If use of such scrap cannot be avoided, you might be able to reduce some of the bad effect by using smaller charges—say, for example, 1000 lb instead of 2000 lb.

(*Concluded on page* 118)

NEW STURDY EFFICIENT

The Model "NYS" ROYER SAND CONDITIONER

Rear view illustrating the unusual expanse of the hopper and combing belt.



Front view showing heavy construction of the underframe and base.

This new Model "NYS" Royer Sand Separator and Blender is designed primarily for supplying large mullers and for use in sand handling systems having a conditioned sand requirement of 60 tons per hour or more. Its rated capacity is from 60 to 100 tons, depending upon the type and temper of the sand.

The "NYS", like all Royer models, gives complete sand preparation . . . refuse removal, blending, even moisture distribution, lump breaking, increased permeability and double aeration. Its sturdy construction . . . heavy welded underframe and base . . . assures foundrymen of many years of service under the most abusive operating conditions.

Write for details on this labor saving, production increasing machine.

SPECIFICATIONS

Capacity: 60 to 100 tons per hour depending on type and temper of sand.

Overall Dimensions: Length—54"
Width—56"
Height—54"
Weight—Approx. 2000 lbs.

Power: 10 or 15 HP depending on requirements of installation.

Construction: Heavy welded angle frame and base.

See the "NYS" featured at the FOUNDRY SHOW next MAY

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.

QUESTIONS *and Answers*

(*Concluded from page* 116)

While you do not mention having trouble from chilled edges or hard iron in the thin sections, we would expect that to occur with the low pig, high scrap charge unless ferrosilicon or silvery pig is added. Silicon in your iron appears to be around 2 per cent, but for thin sections around ⅛-in., we believe it should be 2.30 to 2.40 per cent. Hence, sufficient high-silicon material should be added to the charge to bring the silicon up to 2.60 to 2.70 per cent as charged to provide 2.30 to 2.40 per cent Si over the spout.

White Iron Shows Spongy Area

Q.—In our foundry in Mexico we have occasional trouble in casting white iron parts in that the surface in spots shows a spongy effect from ⅛ to ¼-in. deep. Can you suggest the cause and what should be done to eliminate the defect?

A.—Without a specimen of the casting to examine, it is difficult to supply a definite answer. Our guess would be that the trouble is in molding and is caused by one or more of these factors: Presence of excess moisture; presence of clay or sand balls resulting from improper sand mixing or addition of clay; possible presence of tramp iron, wood or other foreign material in the sand, or uneven ramming whereby some parts of the mold are rammed much harder than necessary.

Probably none of these conditions is severe enough to result in definite blows, but is sufficient to prevent the metal from lying quietly and causes a slight agitation or fluttering of the metal until solidification occurs. Remedy, of course, is to examine conditions to determine the particular cause or combination of causes, and then apply the necessary corrective.

Sprocket Wheel Gated on Hub

Q.—We are preparing to make a considerable number of cast iron sprocket wheels 10 in. diam, web center ⅝ in. thick, hub 5 in. diam, 1 in. high on each side of the web, 1 in. core in center of hub, and three oval windows in the web. The molds are to be made on a squeezer machine. The pattern is a pressure cast aluminum plate and half pattern. The casting is symmetrical. We shall appreciate your suggestion on the best type of gate to use on this casting. Also any other pertinent suggestions.

A.—For maximum economy the mold should be made in a circular flask or snap flask, 12 in. diam. A square flask 12 in. from side to side will serve satisfactorily, but will take a little more sand. If the molds are made in a snap flask, it may be advisable to place a thin steel band inside the flask for each mold to reinforce the sand. Under certain conditions—for example, where two or more castings are molded in a single flask—a single sprue in the center may feed a small runner connected to several teeth by light gates. However, in ordinary practice the castings are molded and cast as single units.

Metal is poured into the mold through a small vertical sprue on the hub. The upper end of the sprue is flared to catch the stream from the ladle, and later to serve as a feeder while the hub of the casting is shrinking. In this particular casting the amount of shrinkage is almost negligible. The shrinkage feature also is responsible for using a cope 5 in. deep, while 4 in. or a little less will serve for the drag. It may be pertinent to point out that a clear exit for steam and gas must be provided between drag and bottom board.

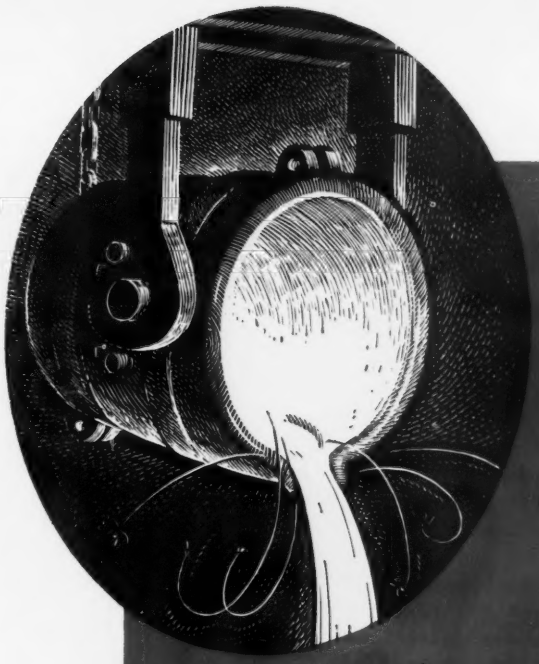
A certain amount of steam will escape upward through the windows in the web, but the greater part will go through the bottom. Lack of adequate vent passages in the drag causes the metal to boil in the mold and produces cavities in the metal sometimes diagnosed as shrinkage cavities. A small wood cone 1 in. diam at the bottom and 3 in. at the top is attached to the squeezer head on the molding machine directly above any part of the wheel hub. This forms the top or pouring end of the sprue. The remainder of the passage is formed by a sprue cutter, a short tapered tube which the molder forces down from the apex of the cone opening to the top of the pattern hub. The tube removes a sand core 1 in. diam and 2 in. in length. The one pattern and the one machine make cope and drag. The sprue indent may be left in the drag, or it may be filled with a handful of sand before the drag is turned over.

Wheel Hub and Rim Defective

Q.—We are having some difficulty in our molding in that small holes appear in our gray iron pulley castings, usually in the interior of the hub, sometimes before and sometimes after machining. We have tried every method with which we are familiar in gating and heading the casting, but without success. We have gated it on the hub and placed risers on the rim. Gated it on the hub with no risers on the rim. Gated and headed it on the rim, with and without heads on the hub. Have increased size and height of gates and risers. Best results have been with a slide riser near the top of the hub with the object of draining the cold iron. This involves extra work. We shall appreciate advice on this problem.

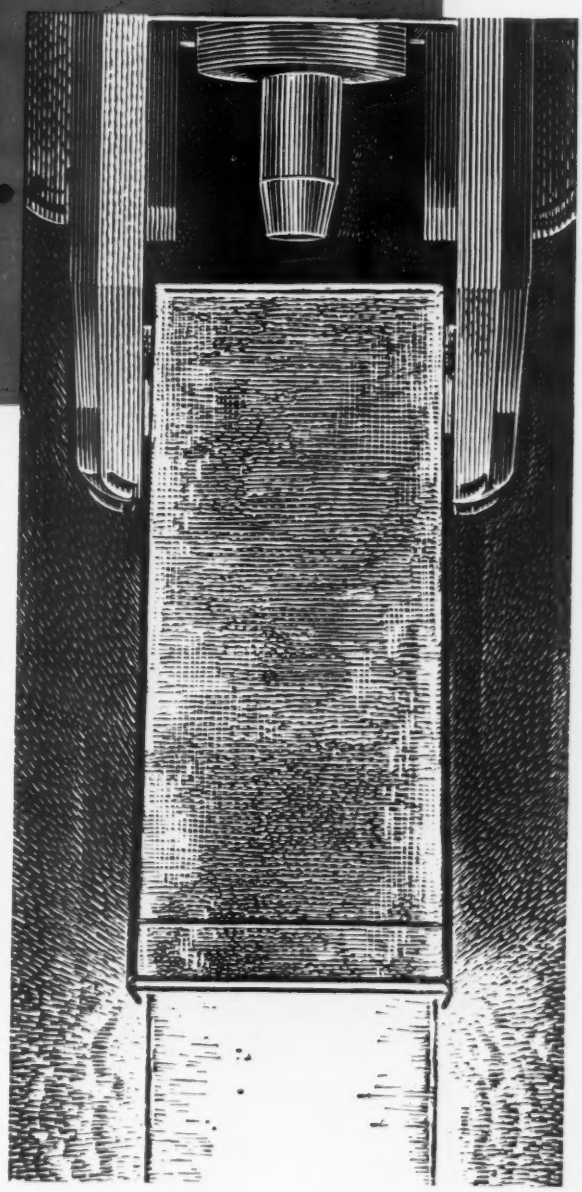
A.—We do not think any of your gates and heads (reservoirs of molten metal) are responsible for the small holes in the interior of the hub or on the rim face. The holes are caused by gas or steam bubbles generated while the molten metal is in contact with the mold and core face.

High-permeability sand will permit the steam and gas to escape through the voids. Artificial venting with a wire will permit the gas to escape through lower permeable sand. Our suggestion is to use a coarser, more permeable grade of sand. Vent around the rim with a wire. Incorporate as large a vent opening as possible in the center or hub core. Pour the metal through a ring of small pop gates on the hub. Place one or two feeding heads on the rim.



POUR FASTER...

STRIP FASTER...



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Mold stools with graphite inserts stand up to the hot-metal impact of fast, uniform pouring... absolutely *eliminate* the bottleneck of stool-sticker slow-ups. Ingot cars move evenly... you get greater man-hour productivity and, incidentally, much longer life from essential materials and equipment.

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MEN

of Industry

JOSEPH L. TILLMAN, formerly executive vice president, is now president, Unitcast Corp., Toledo, O. succeeding **Lambert J. Tillman,** who has become vice chairman of the board of Unitcast Corp., and chairman of the board, Canadian Unitcast-Steel Ltd., its Canadian subsidiary in Sherbrooke, Quebec, following the death of Arthur D. Neale. **Ralph F. Tillmann** has been named chairman of the board of directors, succeeding **W. E. Wine,** who has been named honorary chairman. Joseph L. Tillman was graduated from Notre Dame University in 1921, when he became plant engineer, Maumee Malleable Castings Co., Toledo, O. Two years later he joined Industrial Steel Casting Co., predecessor of Unitcast Corp., as works manager, becoming vice president in 1929. In 1937, following formation of Unitcast Corp., through a merger of plants, Mr. Tillman became vice president and in 1946, executive vice president. In 1948 he was named president of the company's Canadian subsidiary in Sherbrooke, Quebec, when it was organized as Canadian Unitcast-Steel Ltd.

♦ ♦ ♦

Eugene Fiamma, recently re-elected president of the Metropolitan Brass Founders' Association for 1952, is president of World Brass Foundry Co., Brooklyn, N. Y. Mr. Fiamma entered the foundry industry in 1910 and served his apprenticeship in one of the oldest jobbing shops in New York. During World War I he worked in several other shops, supplementing his education with extension courses in mechanical drawing at Cooper Union. With a partner he founded Globe Brass Foundry Co. in 1919 and 10 years later sold his interest in that company and acquired joint ownership in World Brass Foundry Co. Mr. Fiamma was vice president of Metropolitan Brass Founders' Association in 1950.

Ray Ortgies has been appointed foundry supervising engineer with the Dust Control Division, American Air Filter Co., Louisville. Mr. Ortgies, who attended University of Illinois, was formerly manager of the Air Cleaning Division, Whiting Corp., Harvey, Ill.

♦ ♦ ♦

A. Rasmussen, formerly sales manager, the Fahralloy Co., Harvey, Ill., has been named vice president-plant manager. **Robert E. Kroc,** who has been assistant sales manager, has succeeded Mr. Rasmussen as sales manager. Mr. Kroc has broad experience in design, production and marketing of chromium-nickel and stainless steel castings produced by the company.

♦ ♦ ♦

W. Frank Kelly has been appointed assistant vice president and **John E. Holtman,** general superintendent of foundries, American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill. Mr. Kelly joined the division as a foundry clerk in 1925, became works manager in 1941 and has been general superintendent of foundries since 1946. Mr. Holtman entered the Denver plant of the division in 1930, became works manager there and later at the St. Louis plant, and since 1946 has been works manager of the Chicago Heights plant of the division. **Bruno S. Weselis,** formerly assistant works manager, has been appointed works manager at the Chicago Heights plant and **Paul H. Bohlen,** formerly division trackwork engineer, has succeeded Mr. Weselis as assistant works manager.

♦ ♦ ♦

August C. Vierthaler, for many years vice president, has been named president, Iroquois Foundry Co., Racine, Wis., succeeding **John C. Juras** who has retired. **Walter A. Vierthaler,** who has been in charge of foundry operations, has become vice president. **A. J. Schmidbauer** will continue to schedule production and

(*Continued on page* 122)

JOSEPH L. TILLMAN
. . . pres., Unitcast Corp.

EUGENE FIAMMA
. . . heads brass founders

RAY ORTGIES
. . . dust control engineer

A. RASMUSSEN
. . . v.p., Fahralloy Co.

Increase Customer Satisfaction

with APEX Products

ALUMINUM ALLOYS	*for all types of castings*
ALUMINUM	*for steel deoxidizing and grain control*
ALUMINUM BASE HARDENERS	*for alloying and grain refining purposes*
GRAINED ALUMINUM	*for thermit reductions, steel metallurgy, chemical applications, etc.*
ALUMINUM FLUXES	*for cleansing and grain refining all alloys*
MAGNESIUM ALLOYS	*for all types of castings*
MAGNESIUM ANODES	*for cathodic protection*
ZINC ALLOYS	*for die castings and metal forming dies*

In the Apex laboratories, Apex research and facilities are devoted to producing *better* ingot, analyzing particular problems for foundries who use *all* methods of castings—sand, permanent mold or die casting. Thus, Apex maintains always this high standard: "Best in every test from Ingot to Casting!"

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Spectrographic standards . . . Chemical analytical methods . . . Physical and mechanical property tests . . . Chemical, quantometer and spectrographic analyses . . . Field engineering.

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CARL W. TUOHEY
. . . tractor shovel sales

ODD H. McCLEARY
. . . Mathews general mgr.

LEONARD T. SYLVESTER
. . . pres., Mathews Conveyer

H. J. MORRISON
. . . Cleveland mgr., ALCOA

(*Continued from page* 120)

sales, and will also act as company secretary. **Roy Ruland** continues as treasurer.

♦ ♦ ♦

Carl W. Tuohey has been appointed representative for Frank G. Hough Co., Libertyville, Ill., in New York, New Jersey, Pennsylvania, Virginia, Delaware, West Virginia and New England. Mr. Tuohey was graduated from Purdue University and in 1950 joined the Hough organization where he has had intensive training in application of tractor shovels made by the company. In his new position Mr. Tuohey succeeds **William Cornell,** who has been recalled to active service with the Marine Corps.

♦ ♦ ♦

Leonard T. Sylvester, president and managing director, Mathews Conveyer Co. Ltd., Port Hope, Ont., has been elected president of the parent company, Mathews Conveyer Co., Ellwood City, Pa., succeeding the late William L. Dean. **Odd H. McCleary,** vice president, has been elected vice president-general manager. **Lee Sekulski,** sales manager, has been made a director. **Frank E. Moore** continues as chairman of the board. Mr. Sylvester will continue as president of the Canadian subsidiary in Port Hope, Ont., and Mr. McCleary will be in charge of all operations at Ellwood City. **P. W. Brown** continues as president-general manager of the Pacific coast subsidiary in San Carlos, Calif.

♦ ♦ ♦

H. J. Morrison, recently appointed assistant works manager of Cleveland operations for Aluminum Co. of America, has been named manager of the Cleveland works, succeeding **Harold C. Erskine,** who has been appointed division manager for Alcoa's die casting operations. During World War II Mr. Morrison managed the company's forging operations in New Castle, Pa., and became manager of the Cleveland forge plant in 1944. Mr. Erskine has been Cleveland works manager since 1943. Prior to that he was works manager of the Fairfield, Conn., works.

♦ ♦ ♦

D. V. Sherlock, recently retired as vice president, Blaw-Knox Co., Pittsburgh, and manager of its Union Steel Castings Division, has been recalled to serve as acting manager of the Blaw-Knox Division, Blawnox, Pa., succeeding **L. E. Joseph,** resigned.

♦ ♦ ♦

J. R. Steelman has been elected president of Koehring Co., Milwaukee. He succeeds **G. E. Long** who continues as chairman of the board. Named vice president and general manager was **E. A. Brugger,** formerly vice president for production. Subsidiaries of the Koehring company are: Parsons Co., Newton, Iowa; C. S. Johnson Co., Champaign, Ill., and Kwik-Mix Co., Port Washington, Wis.

♦ ♦ ♦

Dr. George O. Curme, vice president in charge of all research activities, Union Carbide & Carbon Corp., New York, has been elected a director to succeed the late **James A. Rafferty.**

♦ ♦ ♦

C. D. Barr, since 1946, president, American Cast Iron Pipe Co., Birmingham, has been named chairman of its board of directors. **C. O. Hodges,** executive vice president, has succeeded Mr. Barr as president. **J. A. Woody** was named vice president-production; **A. E. Bowen,** treasurer; **F. H. Coopland,** works manager; **B. B. Warren,** assistant works manager in charge of personnel and public relations; and **J. T. Vann,** assistant works manager-operations. All other officers were re-elected. Mr. Barr joined the company in 1908 and Mr. Hodges in 1917.

♦ ♦ ♦

George C. Worthley has been appointed general manager of the Scale Division, Fairbanks, Morse & Co., Chicago, which recently announced autonomous operation for that division. **J. S. Peterson** succeeds Mr. Worthley as sales manager.

♦ ♦ ♦

William M. Wallace has been appointed an assistant to the vice president of the General Machinery Division, Allis-Chalmers Mfg. Co., Milwaukee. He has been associated with the company since 1937, serving as a sales representative in the Denver and Pittsburgh district offices, and since 1947 has been a special assistant to the manager of the company's processing machinery department.

♦ ♦ ♦

Andrew B. Stevens has been promoted to assistant factory manager, American Wheelabrator & Equipment Corp., Mishawaka, Ind. Mr. Stevens was supervisor of production control and stores with the company the last six years.

♦ ♦ ♦

Edward H. Fisher has been named general manager of A. B. Farquhar Co., York, Pa., which recently has become a division of Oliver Corp., Chicago. He succeeds his father, **William J. Fisher,** formerly president of the Farquhar organization, who has been elected vice president and director of Oliver Corp.

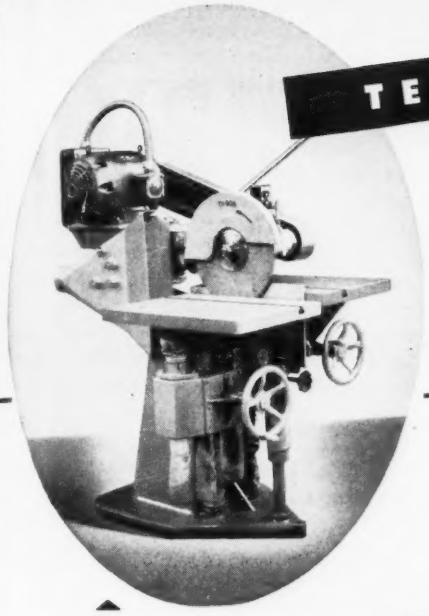
♦ ♦ ♦

Thomas W. Teetor, until recently a member of the engineering staff of Swayne, Robinson & Co., Richmond, Ind., has been made development engineer for that company. A

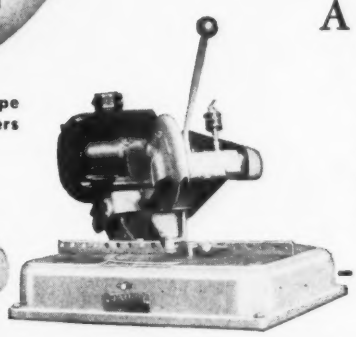
(*Continued on page* 124)

TEST YOUR

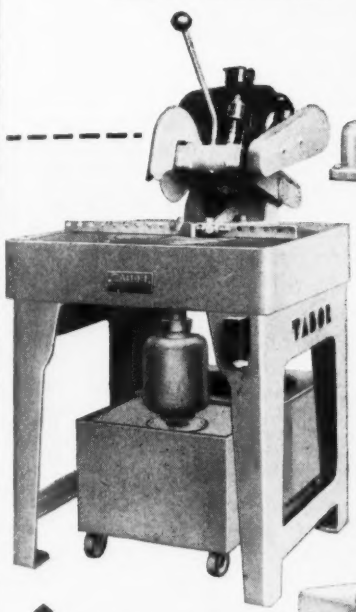
Industrial Quotient!



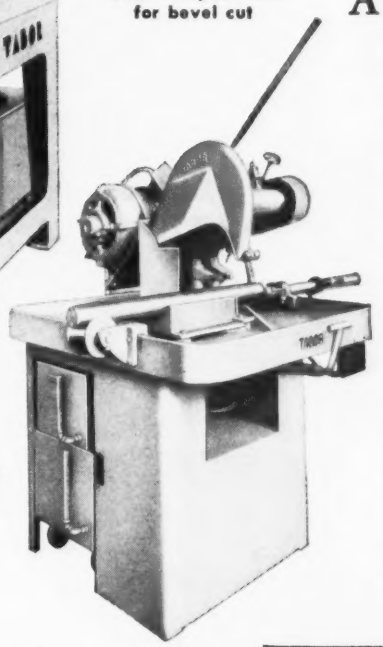
10 H.P. split-table type cutoff for gates and risers



3 H.P. bench-type cutoff for bar stock and shapes—set for bevel cut



3 H.P. floor-type cutoff for bar stock and shapes—equipped for bevel wet cutting



10 H.P. cutoff for bar stock and shapes—with coolant reconditioning tanks

Q WHAT DOES EVERY FOUNDRYMAN KNOW?

A Tabor's line of Abrasive Cutoff machines for the foundry floor—machines that will cut gates and risers from castings of even the toughest metals in a matter of seconds—clean, close-to-the-casting cuts with few or no snags or burrs—a line of cutoffs that ranges from small "standards" to giant "universals."

Q WHAT SHOULD EVERY FOUNDRYMAN KNOW?

A That Tabor's Cutoff machine "family" has grown to include units for cutting bar stock and shapes—a point of special importance to management of captive shops and foundries with their own machine shop operation.

There's a size and type to meet every need. Capacities range from 3 to 15 H.P. There are bench-mount types and floor types. They can be furnished for wet or dry cutting—bevel or right angle.

The "heart" of these machines—the spindle—bears the same stamp of excellence for which our foundry units are famous. Timken Bearing-mounted, specially constructed, the spindle assures cool running and reduces end-play adjustment to an all-time low.

It'll pay you to get full details on these tough, precise, "production-minded" newcomers. We've prepared new bulletins. They're yours for the asking—so write today.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

The TABOR Manufacturing Co.

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FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

THEY'RE CUT OUT...TO CUTOFF!

EXPORT DEPARTMENT, 765 DREXEL BLDG., PHILA. 6, PA.

(*Continued from page* 122)

Purdue University graduate, Mr. Teetor was associated with Columbus Malleable Iron Co., Columbus, O., for two and a half years before joining Swayne, Robinson early in 1951.

♦ ♦ ♦

Robert W. Ellms has been named assistant chief engineer, Machine Division, Osborn Mfg. Co., Cleveland, and **Ted Hatch** has become supervisor of the division's Research and Development Department. Mr. Ellms joined the company in 1934 as a designer of molding machines. Mr. Hatch became associated with Osborn in 1950.

♦ ♦ ♦

Clinton F. Robinson has been elected president and a director of the Carborundum Co., Niagara Falls, N. Y., succeeding **H. K. Clark,** who has resigned as president but will continue as a director. Mr. Robinson was graduated from West Point in 1924, later obtaining an engineering degree at Cornell University. He retired from the Army as a major general in 1948. During World War II, among other assignments, he was associated with the chairman, in organizing the War Production Board. Since that time he has served in various government agencies including War Assets Administration, as assistant to the Secretary of Defense, and as assistant to the chairman of the National Security Resources board. **Paul B. Brown, Clarence E. Hawke,** and **William H. Wendel,** formerly managers of the Bonded Products and Grain Division, Refractories Division, and Coated Products Division, respectively, have been elected vice presidents in charge of their divisions.

♦ ♦ ♦

David D. Gibbs recently joined FOUNDRY advertising staff as a member of its market and research department. During co-operative work study at Antioch College, where he was graduated last June, Mr. Gibbs was associated with National Broadcasting Co., New York; Carson, Pirie, Scott & Co., Chicago; the Antioch College Bookstore which he managed for a year, and McGraw-Hill Book Co., New York, where he was sales correspondent and editorial assistant in the secondary school textbook department. Since leaving Antioch College Mr. Gibbs has been associated with J. C. Penney Co., Elyria, O., in sales and personnel work.

♦ ♦ ♦

T. Wolcott Hooker, vice president in charge of sales, Hooker Electrochemical Co., Niagara Falls, N. Y., has been elected president of the Compressed Gas Association. **John H. Mills,** Bridgeport Brass Co., was elected the association's first vice president; **R. J. Thompson,** Kinetic Chemicals Division of E. I. duPont de Nemours & Co., second vice president; and **Franklin R. Fetherston** was re-elected secretary-treasurer.

♦ ♦ ♦

Earl W. Cunningham has been named general manager of the Industrial Heating Department, General Electric Co., with headquarters at Schenectady, N. Y. Acting manager of the department since 1951, Mr. Cunningham succeeds **Carl L. Ipsen** who has returned from service with the National Production Authority, Washington, and will serve as consultant.

♦ ♦ ♦

John F. Schnur, foundry superintendent, McLean Iron Works, Palatka, Fla., has been named foundry technologist, Armour Research Foundation, Illinois Institute of Technology. Mr. Schnur has been assigned to a project in India by the foundation, where he will conduct studies of foundry practices and recommend modernized techniques. For 30 years he was a foundry specialist and consultant in foreign countries including China, Nicaragua and the Netherlands West Indies.

♦ ♦ ♦

J. H. Treanor, formerly vice president, has been elected president, Mystic Iron Works, subsidiary of Eastern Gas & Fuel Associates, Boston. **R. M. Folsom,** formerly president, has been elected chairman of the board. **E. W. Zimmerman** has been named a vice president and **F. S. Holway** continues as sales manager.

♦ ♦ ♦

Karl H. Dressel, associated with the Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O., since 1950, has been promoted to field engineer, with headquarters in St. Louis. Mr. Dressel will represent the company in Missouri in the sale of its belting, hose, and molded and extruded products.

♦ ♦ ♦

John Lund has been appointed district manager of Air Reduction Magnolia Co., a division of Air Reduction Co. Inc., and will maintain headquarters at Shreveport, La. Mr. Lund, who succeeds the late **Heber T. Wadley,** has been associated with Air Reduction since 1927 and has had sales and service experience in Detroit, Bettendorf, Iowa, Oklahoma City, Okla., and Shreveport.

♦ ♦ ♦

R. J. Foresman, general sales manager, Mid-West Abrasive Co., Owosso, Mich., has been made a director, succeeding the late Phil Huber.

♦ ♦ ♦

Harry A. Porter Jr. has been assigned to the Chicago office, Michiana Products Corp., Michigan City, Ind. succeeding **J. H. Staiger.** Mr. Porter, a graduate of Carnegie Institute of

(*Continued on page* 126)

TED HATCH
. . . research, Osborn

ROBERT W. ELLMS
. . . Osborn Machine Division

CLINTON F. ROBINSON
. . . pres., Carborundum Co.

DAVID D. GIBBS
FOUNDRY market research

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GET HIGHER YIELD... LOWER SCRAP LOSS AND IMPROVE YOUR STEEL CASTING QUALITY

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- **MEXATOP forms an insulating cover on the molten surface of casting risers . . . keeps the riser metal fluid longer**
- **MEXATOP will not affect casting analysis**
- **MEXATOP is easy to apply and costs only about ½¢ per 6-inch riser.**
- **MEXATOP has been proved in use by America's largest steel producers . . . let us arrange a test and prove it to you.**

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167

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

ROBERT F. TIGHE
. . . Kaiser ingot mgr.

JOHN M. WELCH
. . . Kaiser sales, Chicago

HAROLD FRANCIS
. . . Corn Products Sales

(*Continued from page* 124)
Technology, was formerly with National Malleable & Steel Castings Co. in promotional work.

♦ ♦ ♦

John M. Welch has been named manager of the Chicago district sales office, Kaiser Aluminum & Chemical Sales Inc., Oakland, Calif., succeeding **Gordon C. Anderson** who has left the company. Mr. Welch was formerly assistant sheet product manager and assistant district sales manager, Chicago. **Robert F. Tighe** has become product manager in Chicago for pig and ingot. Mr. Tighe, who was named Cleveland sales representative in 1947, served later as a Cincinnati office sales representative and more recently was assistant product manager, Chicago. **Donald M. Walker** has been appointed assistant product manager, pig and ingot products, Chicago. **Frederick C. Jones,** until recently a service engineer, Cincinnati, has succeeded Mr. Walker as Minneapolis branch representative. **J. A. Keenan,** formerly service engineer in the New York office, has become Rochester, N. Y., branch representative.

♦ ♦ ♦

Harold Francis has been elected a vice president and general sales manager for the Eastern division, Corn Products Sales Co., New York. Mr. Francis joined the New York sales department of the company in 1914 and, following military service in World War I, was sent to the Pittsburgh branch office. He became Chicago branch manager in 1945 and since 1947 has been assistant division manager in New York.

♦ ♦ ♦

Tom Turner has been named vice president in charge of the motor and control division of Westinghouse Electric Corp., Buffalo. Succeeding him as staff vice president in charge of manufacturing is **T. I. Phillips,** formerly in charge of industrial relations. **Robert D. Blasier** is a newly elected vice president of the corporation in charge of industrial relations. **John E. Payne,** another newly elected vice president, is in charge of the company's central sales district.

♦ ♦ ♦

Thomas T. Phipps has been assigned the Cleveland territory as sales engineer for Surface Combustion Corp., Toledo, O. Mr. Phipps has been associated with the sales department of Surface Combustion since his graduation from the University of Michigan.

♦ ♦ ♦

Victor Mancuso has been elected executive vice president and assistant general manager of Axelson Mfg. Co., Los Angeles. Mr. Mancuso formerly was vice president-manufacturing.

♦ ♦ ♦

A. C. Louden has been elected president of Louden Machinery Co., Fairfield, Iowa, succeeding his brother, the late **R. B. Louden. W. L. Fry** and **R. W. Louden** have been elected vice presidents. Mr. A. C. Louden formerly was vice president and has been associated with the company for more than 50 years.

♦ ♦ ♦

Kenneth C. Towe has been elected president of American Cyanamid Co., New York, to succeed the late **Raymond C. Gaugler.** Mr. Towe has been vice president-finance since 1945.

♦ ♦ ♦

William H. Worrilow Jr. has been named general sales manager, and **Robert C. McConnell,** director of industrial relations, Lebanon Steel Foundry, Lebanon, Pa. Mr. Worrilow was graduated from Yale University and until recently was assistant general sales manager of Lebanon Steel Foundry. He is a director of the Alloy Casting Institute. Mr. McConnell was formerly industrial relations and supervisory development consultant, Robert Creaghead & Co., Cleveland. Previously he was in industrial and public relations work with General Motors Corp. and Jack & Heintz Precision Industries.

♦ ♦ ♦

Donald L. Taylor has been named manager of general developments in the development and research department, Hooker Electrochemical Co., Niagara Falls, N. Y., where he will be concerned with general expansion of company operations. Mr. Taylor, a graduate of State College of Washington in 1927, joined Hooker Electrochemical in 1936. Prior to that he was associated with Solvay Process Division, Allied Chemical & Dye Corp.

♦ ♦ ♦

George L. Ratcliffe, general manager of the Baroid Sales Division, National Lead Co., Los Angeles, has been elected a vice president of the parent company. Mr. Ratcliffe was president-general manager of California Talc Co. in 1929, when it was acquired by National Lead Co. and he became general manager of the new Baroid Sales Division. He has been a company director since 1948.

♦ ♦ ♦

Harvey B. Nudelman has been named a research assistant in the metals department, Armour Research Foundation, Illinois Institute of Technology. Mr. Nudelman was graduated from University of Illinois in February.

♦ ♦ ♦

Maynard W. McMillan has been appointed southwestern Ohio territory representative, Baker-Raulang Co., Cleveland, with headquarters in Cincinnati. Mr. McMillan, a graduate of Case Institute of Technology, has served as sales engineer, director of

(*Continued on page* 128)

UNIQUE AIR DEVICES TAKE BIG SLICE OUT OF FOUNDRY PRODUCTION COSTS

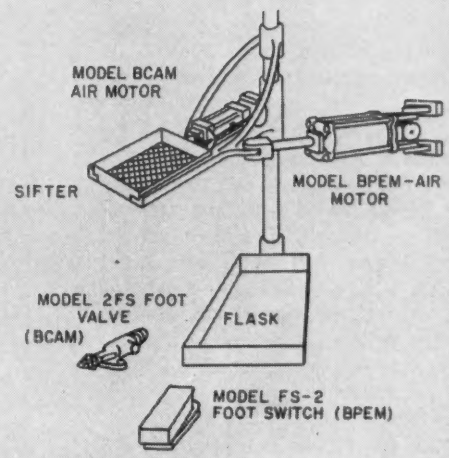
THE effect of automation is being felt in the foundry as it has been in every major industry. Cold-eyed cost and production experts are looking at every manually performed operation suspiciously. Can it be done by air? In surprisingly many cases it can. Much of the conversion of manually operated equipment to semi-automatic machines has been made possible by the development of unique air devices with built-in controls. These units — Bellows Air Motors — are actually air cylinders with either built-in manually or electrically controlled valves. Compact, powerful, flexible in use, they can be easily adapted to much standard foundry equipment; and they lend themselves admirably to tool-room building of special purpose machines.

Typical operations where major savings have been made include sand riddling, core and flash removal, sawing of multiple castings, filling flasks, tamping, positioning molds, opening and closing molds, testing castings, etc.

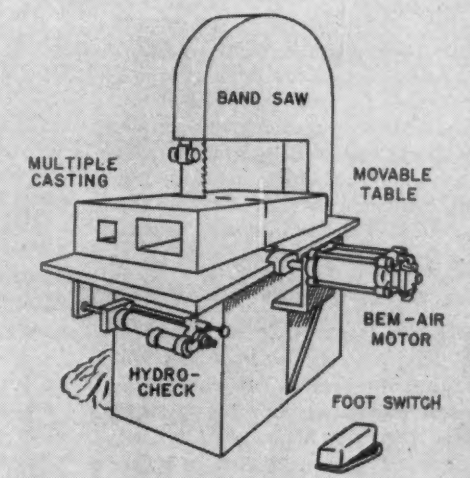
Write for Foto Facts File FF 739 "Air Power in Foundries" and Bulletin CL-30. Free on request.

The Bellows Co.
AKRON 9, OHIO

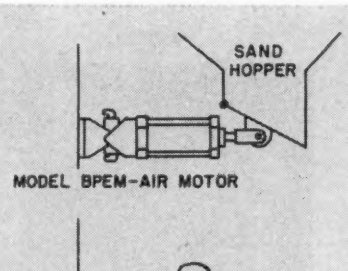
1396



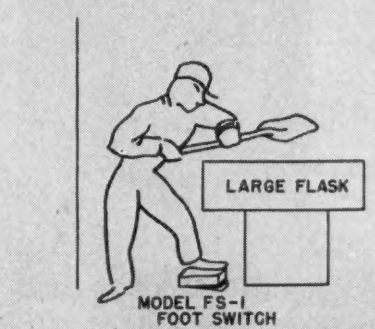
Use of Bellows Air Motors in sand riddling permits use of larger riddle, eliminates fatiguing manual operations.



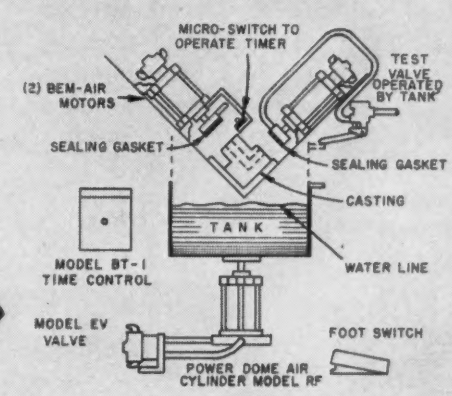
Sawing multiple castings with Bellows Air Equipment enables one man to operate two saws — with better cuts, longer saw life.



Operating sand hopper door with Bellows Air Motor eliminates fatiguing hand labor — multiplies production.



Testing castings under water with air gives a faster, more positive test. One girl can operate two machines.



(*Continued from page* 126)

advertising and public relations and export manager, since joining the company in 1940.

♦ ♦ ♦

Arthur J. Buckley, until recently associated with Harnishfeger Corp., Milwaukee, in home-office and field sales work, has been appointed assistant sales manager, Pangborn Corp., Hagerstown, Md., maker of blast cleaning and dust control equipment.

♦ ♦ ♦

Gordon F. Sondraker has organized Gordon Sondraker & Co., 5259 Atlantic Blvd., Maywood, Calif., to sell foundry supplies and equipment. Previously he had been associated with Dayton & Bakewell, Los Angeles, as vice president and general manager in charge of the metalworking equipment, and foundry supply and equipment divisions. Dayton & Bakewell discontinued the foundry division on Jan. 1 and it was purchased by Mr. Sondraker. Among equipment and supply companies he will represent are Foundry Services Co., Modern Equipment Co., Royer Foundry & Machine Co. and SPO Inc.

♦ ♦ ♦

Keith M. Strong has joined Foundries Materials Co., Coldwater, Mich., to represent the company in Detroit, Pontiac, Flint and Saginaw. Since graduation from Michigan College of Mining and Technology in 1948, Mr. Strong has been associated with York Corp., York, Pa. and Johnson Service Co. at Des Moines, Iowa.

♦ ♦ ♦

George A. Pagonis, recently named chief, Magnesium Castings Section, Aluminum Magnesium Division, NPA, has been associated with the foundry industry 42 years. A native of Greece, he came to United States in 1914. He worked for Isaac & Johnson Co., New York, for 7 years and, following World War I service, he operated his own foundry in New York for 10 years. In 1939 he was appointed foreman, Tri-Boro Brass Foundry, New York, and 3 years later, production engineer, Bendix Aviation Corp., Teterboro, N. J. In 1943 he became superintendent, Permanente Metals Corp., Permanente, Calif. During World War II Mr. Pagonis did development work with magnesium for the aircraft industry. Since the war he has been a consultant for foundries and aircraft companies on aluminum and magnesium problems.

♦ ♦ ♦

Chester H. Lehman has retired as executive vice president, Blaw-Knox Co., Pittsburgh. Associated with the company 42 years, Mr. Lehman continues as a director and vice chairman of the board, and will serve in an advisory and consulting capacity.

♦ ♦ ♦

Stephen A. Keller has been appointed general manager of the Valve Division, Minneapolis-Honeywell Regulator Co., Philadelphia, succeeding **James H. Binger,** who continues as division vice president. **K. R. Knoblauch** continues as sales director. Mr. Keller joined the Valve Division last year, following 10 years with Wright Aeronautical Corp., Dayton, O.

♦ ♦ ♦

Joseph A. Sauer, George F. Krasl and **Elden Butzbaugh** have been named directors, Benton Harbor Malleable Industries Inc., succeeding **H. S. Gray, Pendleton S. Morris** and **A. Ritchie Sawers.** All other officers and directors were re-elected.

♦ ♦ ♦

Nelson S. Cobleigh, formerly a field engineer in the Detroit district office, Ampco Metal Inc., Milwaukee, has been appointed district manager of the Philadelphia sales division. Mr. Cobleigh previously served as a field engineer in the Wisconsin territory.

♦ ♦ ♦

Dr. Abner Brenner has been appointed chief of the Electrodeposition Section of the National Bureau of Standards, succeeding **Dr. William Blum** who has retired following 42 years of service with the bureau. Dr. Brenner will continue research and development of electroplating, electrotyping and electroforming, begun by Dr. Blum in 1929.

♦ ♦ ♦

James G. Nicholson has been named general superintendent, New York Air Brake Co., Watertown, N. Y. **P. B. Fortune** has been appointed director of budgets, methods and manufacturing controls.

♦ ♦ ♦

George C. Floyd, vice president, Vanadium Corp. of America, New York, has been named a company director. Previous to joining the company Jan. 1, Mr. Floyd was a vice president of Thomas Steel Co., Warren, O. **Patrick J. Gibbons** has retired as executive vice president and director of Vanadium Corp., following 32 years of association, but will act in an advisory capacity as consultant to the president.

♦ ♦ ♦

J. P. Little has been appointed sales manager of the Exeter (N. H.) Brass Division of Bridgeport Brass Co., Bridgeport, Conn. Mr. Little will supervise sales of all nonferrous castings made at the Exeter foundry.

♦ ♦ ♦

Eugene L. Buchman has been appointed quality control manager of the Ford Motor Co.'s Cleveland foundry. Mr. Buchman, a University of Detroit graduate, started with Ford in 1932 at the Dearborn Iron Found-

(*Concluded on page* 130)

ARTHUR J. BUCKLEY
. . . Pangborn Sales

GORDON F. SONDRAKER
. . . supply house organizer

KEITH M. STRONG
. . . Foundries Materials sales

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BONDING CLAYS and EXCEPTIONAL FOUNDRY SERVICE

Since 1926

BONDACTOR EQUIPMENT • CUPOLINE REFRACTORY • DURA PRODUCTS

(*Concluded from page* 128)

ry. He was later transferred to the company's experimental foundry, where he advanced to supervisory rank. Returning to the iron foundry, Mr. Buchman until recently was supervisor of its quality control laboratory.

♦ ♦ ♦

Foster W. Lamb has been appointed general sales manager, Automatic Transportation Co., Chicago. A graduate of University of Illinois in 1927, Mr. Lamb until recently was product sales manager, Buda Co., Harvey, Ill.

♦ ♦ ♦

Robert W. Highley has become sales service representative for the Cleveland area for Richard C. Remmey Son Co., Philadelphia, manufacturer of clay and silicon carbide refractories. Mr. Highley formerly was associated with Harbison-Walker Refractories Co., Pittsburgh.

ROBERT W. HIGHLEY
. . . refractory sales

♦ ♦ ♦

Robert L. Ridge was recently honored for 50 years of service with the Chattanooga, Tenn., works, United States Pipe & Foundry Co. Mr. Ridge, a journeyman molder in the company's dry sand foundry, was presented a watch by Paul L. Arnold, works resident manager. He became an apprentice molder's helper in 1902 at the age of 16 with the Whiteside Street foundry of the company. In 1907 he became a journeyman molder and later was transferred to the company's larger Chestnut St. foundry.

♦ ♦ ♦

Richard L. Lindland, secretary, and **William R. Krepps,** executive vice president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., have been elected directors of the company, succeeding **Ira A. Wyant,** founder and former president, and **C. L. Beatty,** who have retired from the board. Mr. Beatty continues as general manager of the company's National Motor Castings Co., South Haven, Mich.

♦ ♦ ♦

William A. FitzGerald has been named assistant sales manager, Ajax Metal Division of H. Kramer & Co., Philadelphia. Mr. FitzGerald attended Banks College of Business, Philadelphia, and joined the Ajax Electric Furnace Division of Ajax Metal Co. in 1939. Following Navy service from 1942-1946, he returned to Ajax Metal Co., which was acquired as a division of H. Kramer & Co., Chicago, in 1950.

♦ ♦ ♦

Dale Spoor, recently chief of the Industries Branch of the Metalworking Equipment Division, NPA, has been appointed manager of Air Reduction Co.'s equipment and process sales department. Mr. Spoor, a graduate of Massachusetts Institute of Technology, previously served in Washington and as manager of the St. Louis district office for the company.

♦ ♦ ♦

Charles W. Niederauer, vice president of the Chemical Division, Borden Co., New York, has been named manager of its Durite Products. **Robert N. Boucher** continues as assistant sales manager of molding compounds and industrial resins. Mr. Niederauer joined the company in 1943, was made executive assistant to the president of the Chemical Division in 1948 and became a vice president last year.

♦ ♦ ♦

P. E. Holder has been named assistant district manager of the St. Louis district for the Industrial Chemicals Division, American Cyanamid Co., New York. He formerly was a sales representative in the Chicago district.

♦ ♦ ♦

Edward G. Matthew is manager of a branch office located at 100 S. Gay St., Baltimore, Md., which was recently opened by the Philadelphia district representative of Baker Industrial Truck Division, Baker-Raulang Co., Cleveland.

♦ ♦ ♦

Sheldon V. Coleman has been appointed sales engineer, Norbide and Floors Divisions, Norton Co., Worcester, Mass., succeeding **Henry O. Richter,** who has retired following more than 38 years of service with the company.

♦ ♦ ♦

George A. Zink, since 1943 works manager, Detroit Diesel Engine Division, General Motors Corp., has been named assistant general manager of the Fabricast Division of General Motors in Bedford, Ind. Following graduation from Purdue University in 1929 Mr. Zink joined the Allison Division of GMC, remaining there as engineer until 1943.

♦ ♦ ♦

Edwin M. Irish Jr. has been appointed sales manager of phenolic products for the Chemical Division, General Electric Co., Pittsfield, Mass. Associated with General Electric since 1944, Mr. Irish has been New England sales representative on phenolic products since 1949.

♦ ♦ ♦

James W. Minter has been appointed Birmingham district sales manager, A. P. Green Fire Brick Co., Mexico, Mo. Mr. Minter attended University of Missouri and joined the A. P. Green company in 1941. Until recently he was in charge of sales at the Chattanooga, Tenn., office.

JAMES W. MINTER
. . . fire brick sales

♦ ♦ ♦

Ben R. Hecker has been appointed field engineer in the Detroit office for Ampco Metal Inc., Milwaukee.

♦ ♦ ♦

A. C. Erlandson, for the last 8½ years superintendent of the Foundry Division, Pettibone Mulliken Corp., Chicago, has been appointed a sales engineer, Kensington Steel Co., there.

♦ ♦ ♦

Harry C. Swanson, recently elected vice president, Chicago Foundrymen's Association, has become president, following the resignation of **C. R. Lindgren,** vice president, Lindgren Foundry Co., Batavia, Ill. Mr. Swanson is vice president, Arrow Pattern & Foundry Co., Chicago. **R. F. Grover,** president-general manager, Love Bros. Inc., Aurora, Ill., was named a director. **Mildred Kosar** continues to serve as executive secretary of the assocation, which is located at 343 South Dearborn St., Chicago 4.

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Discover for yourself what this new General Electric shell resin can offer you —in savings of time and money. And if you haven't tried shell molding, you'll want to check into the benefits that this new process can provide.

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GENERAL ELECTRIC

FOUNDRY EDUCATIONAL COMMITTEES MEET

To Review Progress in Schools and Industry

By WILLIAM G. GUDE
Managing Editor
FOUNDRY

ANNUAL conference of the Foundry Educational Foundation's Technical Advisory and University Advisory committees provided an opportunity for a review of activities and progress in the 14 individual FEF-affiliated engineering schools and a discussion of technical developments in the foundry industry itself.

The meeting, held Feb. 14-15 at Hotel Statler, Cleveland, was attended by more than one hundred staff and student members of universities and industry representatives. George K. Dreher, executive director of the FEF, was conference chairman.

FEF Vice President Marion J. Allen, assistant to the president, American Steel Foundries, Chicago, gave the welcoming address and praised the efforts of the engineering schools for their part in the success enjoyed by the foundation during its brief period of operation. He pointed out that, with widespread interest of educators in the FEF program an accomplished fact, future emphasis can be directed toward improving the type of foundry instruction in the schools, adequate placement and use of qualified student graduates, and the directing of potential foundry engineering students into the universities.

Prefacing a review of the foundation's accomplishments the last 4½ years, Mr. Dreher listed these objectives which continue to guide the organization in its work:

1. To foster and improve education in the United States in the field of foundry engineering, practice and operation among colleges and universities.

2. To encourage and assist students in acquiring education and training in foundry engineering practice and operation.

3. To develop adequate instruction to carry out these purposes.

High lights of the foundation's progress since its inception include:

Number of Schools—Starting with five engineering colleges in 1947, today 14 schools are participating in the FEF program. In addition, liaison is maintained with 46 other engineering colleges which now are teaching some foundry courses and have possibilities of further development.

Courses of Study—Only 14 undergraduate foundry courses were offered as a regular part of the curriculum in the schools now active in FEF. Today the total is 66. Eleven schools now offer foundry courses leading to a master's degree and ten offer a doctor's degree; none was available in 1947.

Teaching Staff—The 11 teachers available at FEF schools for foundry engineering instruction in 1947 (7 craft instructors, 1 engineering instructor and 3 engineering professors) compare with 33 today—5 craft instructors, 10 engineering instructors and 18 engineering professors.

Foundry Laboratories — In 1947 there were such laboratories at only five of the universities; in 1952 there are sizable foundry laboratories at 12 schools. Expenditures on these laboratories the last 4½ years have been nearly $1 million, of which the cost to the FEF has been only $80,200.

The number of engineering students enrolled in foundry courses in the 14 FEF schools has increased steadily since 1947, totaling 21,000 at the end of the 1951 term, while the number of engineering graduates entering the foundry industry during the same period totaled 674. Currently 438 undergraduates are taking the advanced foundry courses at FEF schools. Students from these schools who engaged in summer work in foundries during the 4½ years totaled nearly a thousand.

Mr. Dreher said that foundries and foundrymen seeking to promote the future progress of both the FEF and the industry can help not only through financial support, but also by: Giving useful educational items to the university; encouraging plant visits by students; assisting students on thesis projects; serving on FEF committees; employing summer student workers; recruiting, training and using engineering talent; en-

(*Continued on page* 134)

Dinner meeting held during annual conference of FEF advisory committees in Cleveland

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• SPECIAL BLOCKING 50% FERRO-SILICON • FERRO-MANGANESE • HIGH CARBON FERRO-CHROME • BOROSIL • SIMANAL

BRIQUETS

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Reduce your labor cost . . . Make it easy for the man at the cupola charging door to make exactly the right additions. Ohio Ferro-Alloys briquets provide excellent insurance against error in charging.

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Canton, Ohio
Chicago Detroit Pittsburgh Tacoma Seattle
Minneapolis Birmingham San Francisco Los Angeles

(*Continued from page* 132)

couraging qualified high school graduates to attend engineering colleges.

Use of a basic process chart of the foundry industry, developed by the FEF for use in educational contact activities, was described by H. Charles Esgar, FEF staff assistant. This chart, incorporating a breakdown of the various elements entering into castings production, can be used to illustrate the scope, techniques and talent requirements of the foundry industry.

A summary of the foundry industry, incorporating comparative data on annual dollar value of casting and other major industrial shipments in recent years, was presented by William G. Gude, FOUNDRY. He also showed that since World War II the tonnage of castings shipped has increased 44 per cent, compared with a 23 per cent rise in general industrial activity as measured by the Federal Reserve Board's index of industrial production.

Discussing "College — Military — Foundry Relationships," S. C. Massari, technical director, American Foundrymen's Society, emphasized the importance of industrial contributions to technological advances in various phases of the defense program. It is the responsibility of both the foundry industry and the related engineering education field, he said, to supply competent personnel for both industry and the military, provide ample consulting services for both, and to conduct practical research useful to industry and the military.

One session of the conference was devoted to a symposium on "Status of Casting Design Technology" in which six speakers discussed the subject as related to different types of metals. As the opening speaker, Roger W. Bolz, associate editor, *Machine Design*, pointed to the need for good practical design information for dissemination in the technical press. He said that too little of the material relating to castings that is made available for publication meets the real needs of engineers and designers.

Prof. E. T. Vincent, chairman, Department of Mechanical Engineering, University of Michigan, Ann Arbor, emphasized the need for methods of calculating stresses in parts so as to accurately measure service conditions; also the importance of correlating stress analysis techniques with casting design and foundry practice.

Charles W. Briggs, technical and research director, Steel Founders' Society of America, detailed the fundamentals of good design in steel castings, and illustrated various of these principles with examples of cast and cast-weld parts.

James H. Lansing, technical director, Malleable Founders' Society, pointed out that good casting design permits the most efficient use of the metal's inherent properties, effects economies in manufacture, and provides the most satisfactory service for the part.

Good Design Necessary

Charles O. Burgess, technical director, Gray Iron Founders' Society, also emphasized the economies inherent in good design and urged the broader use of stress analysis in effecting improved design.

Paul G. Maganus, Warren Alloy & Machine Co., Warren, Mich., spoke for the Non-Ferrous Founders' Society and stressed the contributions engineering graduates can make to progress in nonferrous casting.

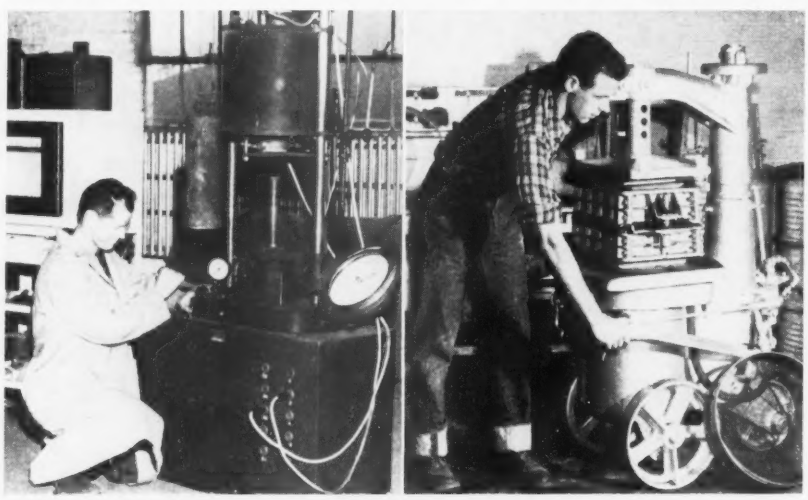
The third conference session program comprised reports by representatives of various FEF schools on certain instructional techniques employed. Prof. R. O. McDuffie, University of Cincinnati, outlined applications of electro metallurgy to foundry work. Prof. Warren Jeffery, University of Alabama, described that school's use of Cobalt 60 in radiographic examination of castings.

Prof. K. H. Donaldson, Case Institute of Technology, reported on a symposium conducted for students over a period of six weeks in which technical experts spoke on different types of castings and participated in an informative question-and-answer session. Prof. C. C. Sigerfoos, Michigan State College, discussed objectives of the engineering pattern-making course conducted at that school, the only one of its type at FEF institutions.

Prof. D. S. Eppelsheimer, Missouri School of Mines, described a 4-in. diameter cupola provided for simple melting experiments at the school; he said it was hoped eventually to provide such units for regular use by all students. Prof. Charles F. Walton, Case Institute of Technology, stressed the need for balance between practice and theory, and showed color

(*Concluded on page* 136)

Foundries Donate Equipment to Michigan State



LOCATION of foundry equipment that could be used for instructional purposes is an important activity of the Foundry Educational Foundation Advisory committee to Michigan State College. The committee asked instructors to list needed equipment with the idea that usable pieces located in foundries and no longer used in production might be obtained for installation in the college foundry laboratory.

Initial results of the drive have been good. At left above, Louis Bachinski, a student from Manistee, Mich., is shown working on a dilatometer, donated by Lakey Foundry & Machine Co. Harry W. Dietert has offered the services of his company to modernize and recondition the unit. Student Elmer LeBay, Toledo, O., is shown at right operating a molding machine donated by Albion Malleable Iron Co.

In addition to the equipment pictured and a bench type core blower received from another foundry, the Albion Malleable Iron Co. gave the college a number of flasks, pneumatic rammers, a 200-lb pouring ladle and a belt conveyor. Lakey Foundry & Machine Co. also supplied numerous aluminum and steel flasks.

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Illustration shows mold half from an "ACCURATE" drag pattern in production at Federal Malleable Company, Milwaukee, Wisconsin.

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Telephone: Trinity 2057

(*Concluded from page* 134)

slides used to acquaint students with fundamentals of metal solidification, riser application, etc.

Raymond G. Thorpe, Cornell University, described the employment of the seminar plan, such as a paper on a design problem for presentation before the advanced foundry engineering group at the school. Richard W. Heine, University of Wisconsin, outlined the advanced foundry course developed at Madison.

C. M. Adams, Massachusetts Institute of Technology, discussed a new textbook, "Metallurgy for Engineers," to be published shortly. Compiled by three MIT engineers, half of the text will cover metallurgical engineering, the remainder being devoted to cast products, welding and wrought metals. The book will be exceptionally well illustrated.

In closing the two-day discussion, Prof. George J. Barker, University of Wisconsin, summarized the important benefits realized from the FEF program to date. Since the near future trend in number of engineering undergraduates is expected to be downward, Prof. Barker urged intensified activity on the part of industry in developing more interest among prospective students in engineering education. He also emphasized that the continuation of scholarships is essential in realizing the objectives of the FEF.

In addition to the daytime sessions, a dinner meeting was held Thursday evening at which Thomas E. Eagan, Cooper-Bessemer Corp., Grove City, Pa., spoke on "Science and Engineering in the Foundry Industry." Mr. Eagan gave a comprehensive review of the numerous instances in which science and technology have been employed to solve the many problems incident to practical foundry operations.

Installs Cupola Fume and Dust Collector

Lincoln Foundry Co., Los Angeles, is installing a cloth-type cupola fume collection system and accessories furnished by American Wheelabrator & Equipment Corp., Mishawaka, Ind. The system includes a quencher, cooling gases from an estimated peak of 1950° F down to 450° F, followed by a secondary cooler to bring the gases down to 275° F. The collector will utilize filter tubes made of Orlon Acrylic fiber, which has a maximum operation temperature of 275° F. The five-compartment collector will be entirely automatic, requiring no manual labor for manipulating damper valves and shaking collected particles from the bags.

J. E. I'Anson, Lincoln executive vice president, handled the design work with the assistance of T. L. Harsel Jr., consultant.

MALLEABLE FOUNDERS' SOCIETY

Plans Market Development Conference

THIRD annual Market Development Conference sponsored by the Malleable Founders' Society will be held Thursday and Friday, Apr. 10-11, at Case Institute of Technology, Cleveland, in co-operation with that school.

Theme of the meeting will be the same as for the previous two conferences—"To stimulate your imagination and add to your information," and the program will cover subjects of particular interest to executive and sales personnel of malleable iron foundries. Daytime sessions will be held at Tomlinson Hall, Case Institute; two dinner meetings are scheduled for nearby Wade Park Manor Hotel.

Thursday's program starts at 10 a.m. with a welcoming address by Elmer Hutchisson, acting president, Case Institute, followed by a discussion of "Status of Our Industry" by Cal C. Chambers, Malleable Founders' Society president.

Among other leading speakers the first day will be Charles A. Chayne, vice president—engineering, General Motors Corp., who will speak on "Engineering in the Automotive Industry," and J. E. Stanton, divisional purchasing agent, Ford Motor Co., whose subject will be "Purchase of Malleable Castings." Subjects relating to materials competitive with malleable iron will be treated by F. Kermit Donaldson, executive vice president, Steel Founders' Society of America, and R. W. Thompson, sales engineer, Transue & Williams Steel Forging Corp.

Friday's session, opening at 9:30 a.m., will include these talks: "Sales Training," by W. V. Machaver, training director, Johnson & Johnson; "A Design Program," by R. L. Gilmore, Superior Steel & Malleable Castings Co., Benton Harbor, Mich.; "New Business in Nodular Iron," by J. O. Klein, Texas Foundries Inc., Lufkin, Tex.; "Defense Business," by Frank E. Shumann, Lehigh Foundries Inc., Easton, Pa., and D. L. Boyes, Central Foundry Division, General Motors Corp.; and "The Economic Outlook for 1952," by Prof. Eli Shapiro, University of Chicago.

An executive's summary will be presented by a panel consisting of Anthony Haswell, Dayton Malleable Iron Co., Dayton, O.; Collins L. Carter, Albion Malleable Iron Co., Albion, Mich.; Charles S. Anderson, Belle City Malleable Iron Co., Racine, Wis.; Henry P. Blumenauer Sr., Albany Castings Co., Voorheesville, N. Y., and Frank D. Brisse, Laconia Malleable Iron Co., Laconia, N. H.

The conference banquet Thursday evening will have Eugene Flack, sales counsel and director of advertising, Sunshine Biscuits Inc., New York as its principal speaker. The concluding dinner Friday will feature a talk on "Gating and Feeding of Salesmen" by Rene Antoine Ferchault, Syndicat General de Fonderie de France.

Kaiser Boosts Aluminum Production Capacity

Kaiser Aluminum & Chemical Corp. has started production at the second of eight potlines being built at its new primary Chalmette aluminum plant near New Orleans. It adds another 25,000 tons annual capacity to the nation's aluminum production facilities.

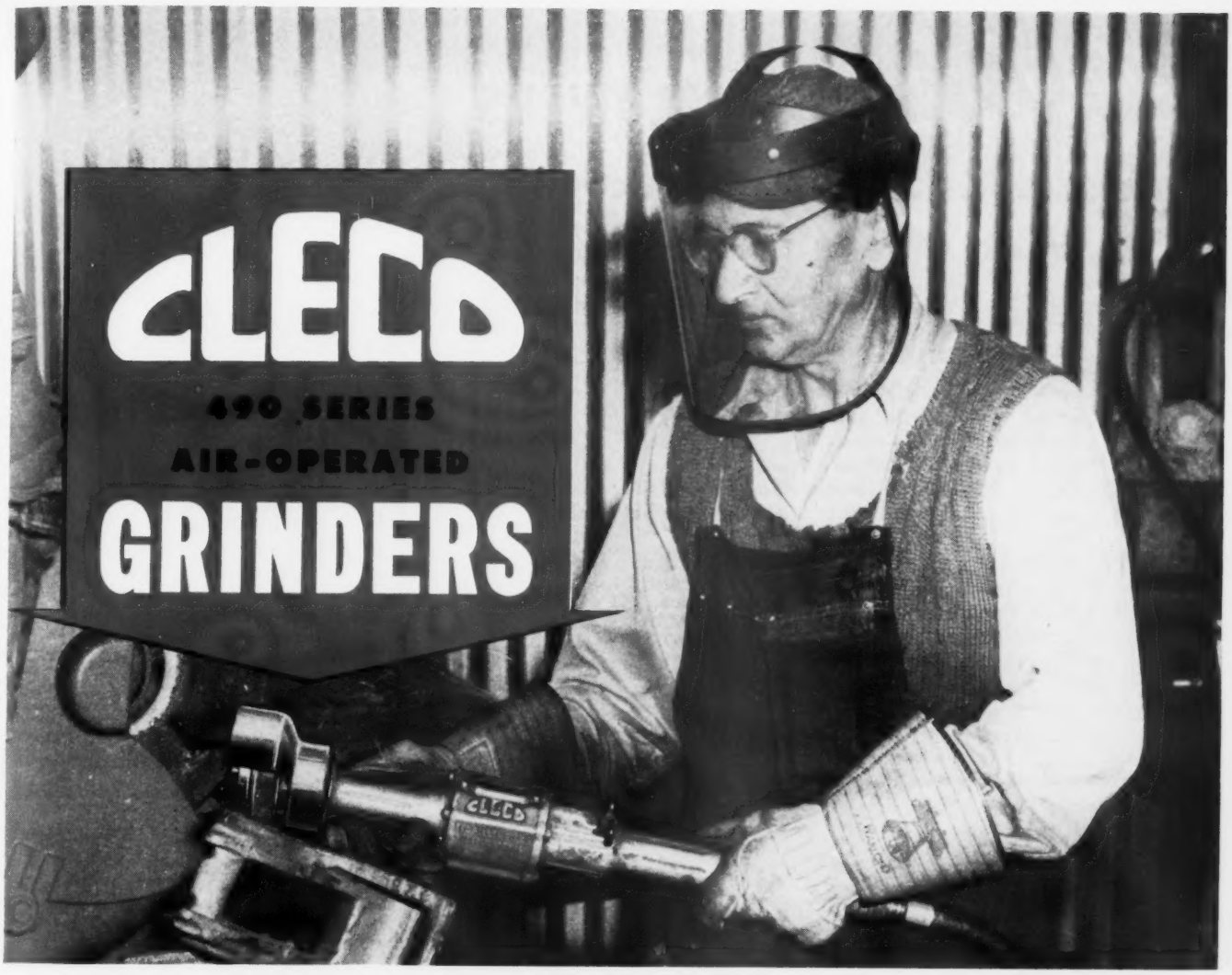
New Manganese Facility

Electro Metallurgical Co. plans to build new facilities for production of electrolytic manganese at its Marietta, O., plant. About 6000 tons a year will be produced. The company already has installed equipment for producing ferrosilicon, high-carbon ferrochrome, ferromanganese and silicomanganese.

Book Review

Engineering Materials Manual, edited by T. C. DuMond, cloth, 386 pages, 8½ x 11½ in., published by Reinhold Publishing Corp., New York. Price $4.50.

Complete descriptive information and reference data are given on engineering materials of interest to industry, in this collection of articles which appeared in *Materials & Methods*. The volume comprises 28 sections, each covering a material or group of materials. Included are irons, steels, stainless steels, aluminum, magnesium, copper alloys, plastics, rubber, ceramics, and several types of finishes and coatings.



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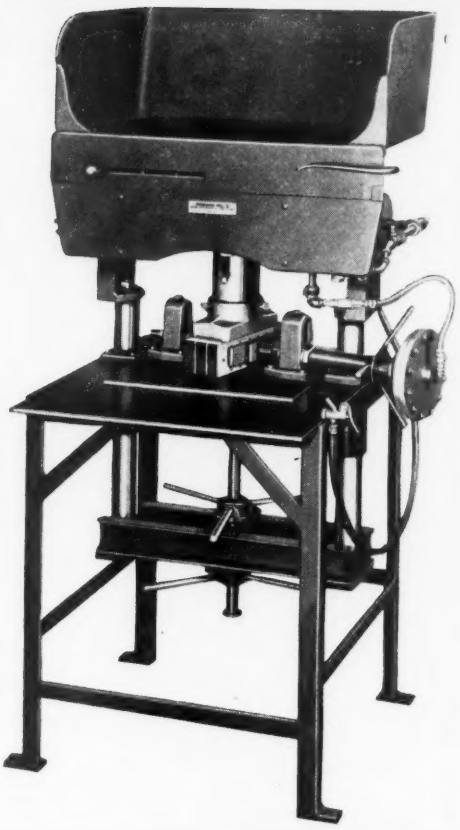

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4. Easy accurate locating of core boxes.
5. Quick change magazine heads.
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7. Quick change, fully adjustable, vertical clamping attachment.
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CAPACITY: Cores up to 5#

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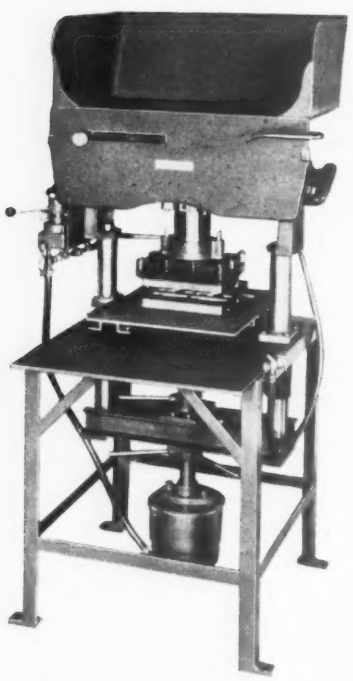

A fast and accurate DRAW TYPE core blower for small work—has stationary sand magazine and many additional features assuring maximum production. Quickly adjusted to accommodate core boxes not requiring the draw feature. Can be equipped with clamping attachment for vertically split core boxes.

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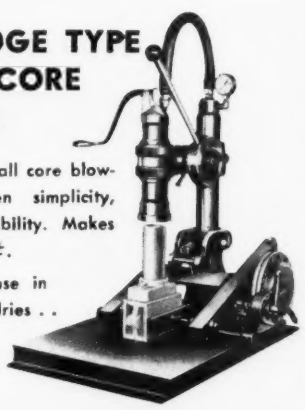

The original small core blower . . Proven simplicity, speed and flexibility. Makes cores up to 2#.

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5. CORE BOX VIBRATION—Controlled by keeping draw valve handle depressed during draw operation.
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CASTING SHIPMENTS REACH RECORD HIGH

DESPITE shortages of raw materials during a large part of the year, the foundry industry broke all previous records in shipments of castings during 1951, according to figures compiled by the Bureau of the Census.

Shipments totaled 18,968,728 tons, compared with 16,025,744 tons in 1950, an increase of 12.1 per cent. Previous high was in 1948 when shipments were 16,210,065 tons. These figures do not include zinc and zinc-base alloy, and lead and lead-base alloy die castings. Including those castings the grand total for 1951 was 19,203,280 tons, and that for 1950 was 16,300,693 tons.

While gray iron casting shipments for December, 1951 dropped 13 per cent below those for November, total shipments for the year were 14,987,696 tons, against 12,905,562 tons in 1950, an increase of 16 per cent. Nearest approach to the 1950 record of shipments was in 1948 when they were 12,785,909 tons.

Malleable iron shipments also reached a new high in 1951 with 1,083,545 tons, compared with 920,502 tons in 1950, a gain of 17.7 per cent. Previous high in shipments of malleable iron castings was in 1948 when they reached 933,265 tons.

Steel Near Previous Record

Steel casting shipments in 1951 exceeded those in 1950 by 43.9 per cent —2,100,970 tons in 1951 and 1,459,382 tons in 1950. Last year's shipments were exceeded only during the war year of 1944 which showed 2,435,421 tons.

Nonferrous casting shipments in 1951 increased 7.6 per cent over those for 1950 as indicated by 796,517 tons compared with 740,298 tons. In those totals the shipments of aluminum castings for 1951 were 218,024 tons while in 1950 they were 226,305 tons, a decrease of 3.5 per cent. Record high shipments of aluminum were 257,200 ton during the war year of 1944.

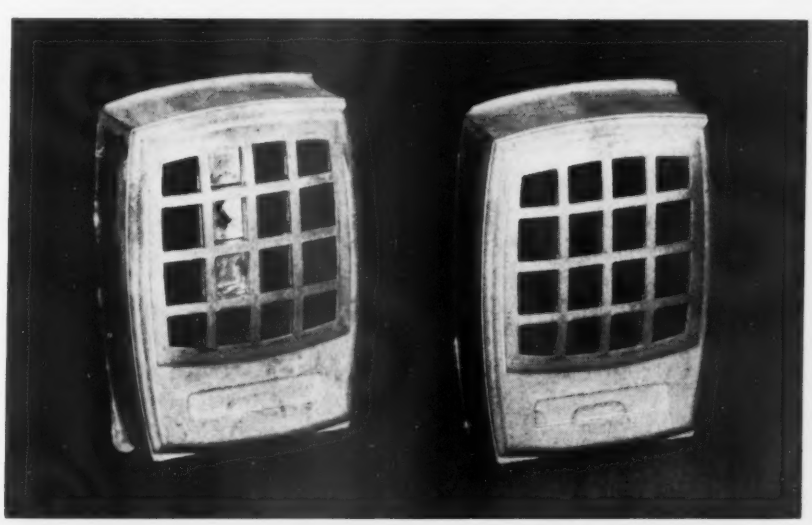
While magnesium alloy casting shipments of 12,791 tons nearly doubled those of 6157 tons in 1950, they were far short of the 100,743 tons shipped during 1944 when incendiary bombs made up a large share of the year's total output.

Copper-base alloy casting shipments in 1951 of 565,701 tons exceeded 1950 shipments of 507,836 tons by 11.4 per cent. While 1951 deliveries were the largest since 1944, they were well below the 1943 peak of 762,000 tons.

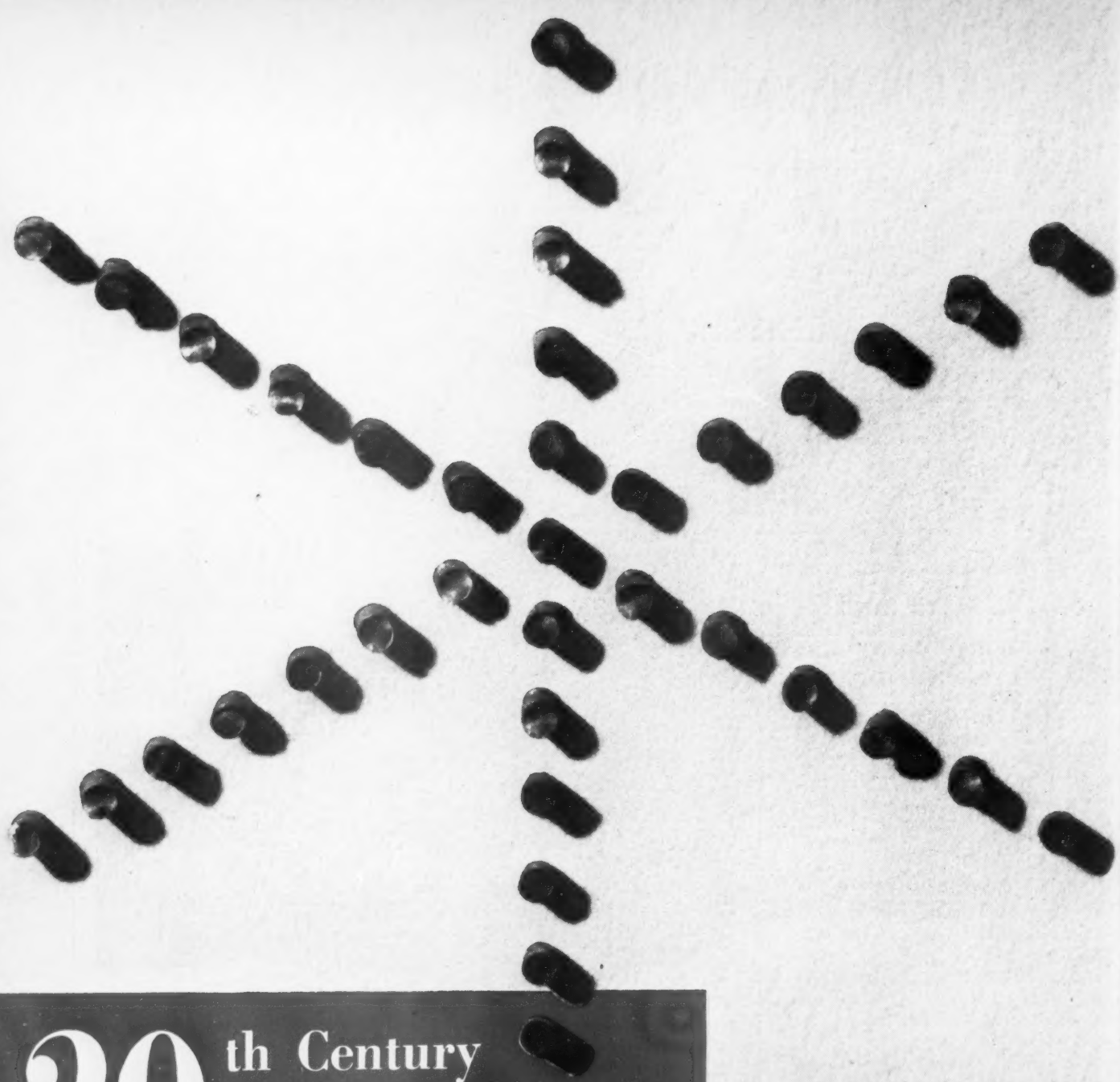
Total production of coke for all uses in 1951 was 79,123,000 tons, against 72,718,000 tons in 1950, an increase of about 9 per cent. Of these totals, however, less than 10 per cent was used in the foundry field. Figures for coke consumption by foundries in 1951 were 7,070,968 tons, compared with 6,862,614 tons in 1950, a gain of 3 per cent.

Increase in gray and malleable iron shipments last year is reflected in the expanded consumption of iron and steel scrap in the cupola. In 1951 the amount used was 11,090,607 tons while in 1950 it was 9,474,000 tons, an increase of 17 per cent. Consumption of iron and steel scrap in the air furnace increased from 1,118,000 tons in 1950 to 1,203,740 tons in 1951, up 7.6 per cent. Greatest increase in consumption of those materials was in the electric furnace. In 1951 the total used was 8,391,919 tons, compared with 6,385,000 tons in 1950, an increase of 31.5 per cent.

Wheeler Protective Apparel Inc., formerly located on one floor at 224 West Huron St., Chicago, has doubled its space and personnel.



APRICOT PITS used in airless blast cleaning equipment deflash die cast aluminum microphone front cover plates at Electro-Voice Inc., Buchanan, Mich. Manual deburring is greatly reduced, and the castings have a fine surface finish. About 300 microphone covers are finished in 15 minutes. Top photo shows castings loaded in the cleaning machine. At bottom, left, is a cover before cleaning, and at right, after cleaning. Photos by courtesy of American Wheelabrator & Equipment Corp.



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Foundry STATISTICS

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1949	713,330	371,214	.....
1950			
Dec.	91,510	51,091	194,950
Total	920,502	512,192	.....
1951			
Jan.	92,508	54,817	234,060
Feb.	88,950	54,915	255,347
Mar.	101,667	60,265	267,169
Apr.	97,276	57,554	276,463
May	100,800	61,373	274,954
June	94,376	57,176	258,144
July	76,826	45,072	263,017
Aug.	90,727	57,164	249,273
Sept.	82,276	48,568	244,575
Oct.	93,884	58,251	238,019
Nov.	88,210	53,682	220,740
Dec.	76,045	45,543	215,134
Total	1,083,545	654,380	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1949	304,409	106,825	102,908	87,812	.....
1950					
Dec.	46,005	15,681	15,052	14,322	104,380
Total	452,643	154,046	143,821	144,661	.....
1951					
Jan.	42,538	14,401	14,554	12,641	93,264
Feb.	40,785	14,106	13,082	12,852	94,581
Mar.	42,204	15,900	12,771	12,677	100,453
Apr.	40,242	14,455	12,901	12,079	106,077
May	40,487	14,798	13,400	11,692	112,638
June	35,961	13,853	10,323	10,850	112,760
July	27,426	10,739	7,142	8,693	119,461
Aug.	35,531	14,128	10,922	9,526	117,888
Sept.	32,487	13,086	8,829	9,730	122,973
Oct.	35,222	13,950	10,131	10,297	110,382
Nov.	32,367	12,728	8,816	9,926	116,044
Dec.	30,799	12,587	8,387	8,441	112,479
Total	436,049	164,731	131,258	129,404	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Unfilled Orders[2]
1949	724,053	654,444	37,311	.....
1950				
Dec.	100,641	90,606	5,985	68,738
Total	1,022,291	925,495	52,756	.....
1951				
Jan.	102,643	92,171	6,363	77,580
Feb.	96,946	87,667	5,427	75,967
Mar.	110,887	100,221	6,405	79,766
Apr.	101,506	91,852	5,802	82,711
May	105,438	95,049	5,986	84,002
June	98,559	88,818	5,358	83,518
July	76,551	69,334	4,064	85,837
Aug.	94,443	84,720	5,097	84,821
Sept.	85,433	76,304	5,161	84,611
Oct.	94,706	84,544	5,845	82,491
Nov.	87,764	78,640	5,661	82,667
Dec.	76,526	69,653	4,639	80,435
Total	1,131,402	1,018,973	65,808	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1949	9,364	8,781	....
1950			
Dec.	1,528	1,444	6,958
Total	12,314	11,582	....
1951			
Jan.	1,840	1,739	8,616
Feb.	1,907	1,801	10,878
Mar.	2,156	2,058	12,196
Apr.	2,267	2,161	12,191
May	2,334	2,206	12,867
June	1,758	1,642	14,331
July	1,676	1,557	15,528
Aug.	2,270	2,135	16,095
Sept.	2,010	1,931	16,407
Oct.	2,371	2,300	16,143
Nov.	2,774	2,461	15,550
Dec.	2,220	2,098	14,729
Total	25,583	24,089	.....

Foundry Production Workers

Estimated Number

	Dec. 1951	Nov. 1951	Dec. 1950
Gray Iron	153,400	154,800	160,500
Malleable	27,500	28,000	25,600
Steel	66,800	66,300	54,700
Nonferrous	91,900	90,000	93,900

Average Weekly Earnings

Gray Iron	$69.84	$68.96	$72.05
Malleable Iron	72.85	70.62	72.06
Steel	78.66	76.28	72.52
Nonferrous	78.11	74.35	76.21

Average Weekly Hours

Gray Iron	41.3	41.0	44.5
Malleable Iron	41.3	40.4	43.7
Steel	43.7	43.0	43.4
Nonferrous	42.8	41.4	43.9

Labor Turnover Rate (Nov.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	3.6	3.6	2.3	0.6
Malleable Iron	3.3	4.0	2.6	0.4
Steel	5.2	4.2	2.8	0.6
Nonferrous	5.4	4.2	1.8	1.5

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(Net tons[1])

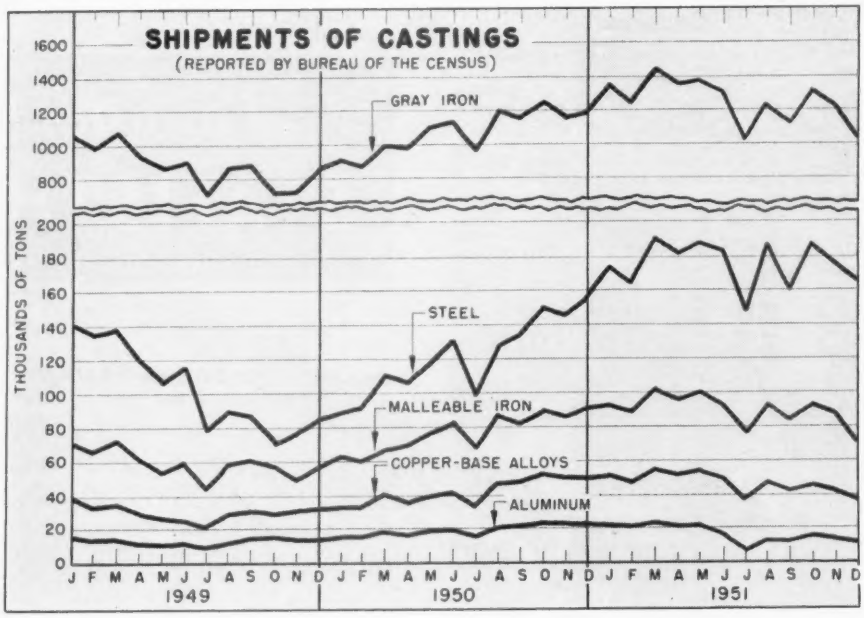
	All Castings—Total	All Castings—For Sale	Miscellaneous Castings Total	Miscellaneous Castings For Sale	Heavy Steel Ingot Molds Total	Heavy Steel Ingot Molds For Sale	Chilled Railroad Car Wheels Total	Chilled Railroad Car Wheels For Sale	Pressure Pipe & Fittings Total[3]	Soil Pipe & Fittings Total[3]	Unfilled Orders[3] Total
1949	10,549,284	5,521,441	6,624,420	2,675,411	1,776,242	759,860	555,569	493,117	1,029,743	563,310	.....
1950											
Dec.	1,181,974	652,929	745,766	333,033	210,700	98,071	43,667	39,984	111,066	70,775	2,012,480
Total	12,905,562	6,880,352	8,117,748	3,415,281	2,308,661	1,043,590	514,074	456,402	1,203,762	761,317	.....
1951											
Jan.	1,364,311	762,407	875,437	405,863	228,824	103,475	56,046	49,065	131,779	72,225	2,297,705
Feb.	1,234,226	684,928	811,724	369,932	193,648	91,598	49,423	43,967	117,141	62,290	2,391,843
Mar.	1,440,149	818,473	920,802	427,162	231,853	114,858	62,282	57,241	144,620	74,592	2,389,659
Apr.	1,363,041	766,735	880,381	403,619	217,970	106,417	61,993	54,002	134,302	68,395	2,336,926
May	1,396,236	796,053	897,913	418,950	225,129	112,145	65,721	57,485	139,854	67,619	2,228,596
June	1,308,987	742,794	847,024	395,329	216,620	108,042	58,620	52,700	121,851	64,872	2,162,152
July	1,028,812	568,126	653,656	301,749	200,764	97,575	40,792	35,202	88,217	45,383	2,208,116
Aug.	1,218,832	697,952	779,838	378,042	222,721	109,257	50,127	44,507	115,284	50,862	2,144,587
Sept.	1,114,789	625,511	704,657	328,331	204,856	96,011	45,467	41,360	111,893	47,916	2,055,392
Oct.	1,301,681	732,764	815,815	382,405	244,556	115,738	53,172	46,483	130,636	57,502	1,983,307
Nov.	1,183,833	674,139	737,971	348,991	222,665	107,569	48,759	43,141	129,766	44,672	1,933,972
Dec.	1,032,799	582,614	646,352	309,696	204,911	94,857	41,594	38,119	108,767	31,175	1,847,065
Total	14,987,696	8,449,515	9,571,570	4,469,069	2,624,517	1,257,542	633,996	563,272	1,474,110	699,000	.....

Steel Castings—Shipments

(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[3] Total
1949	1,250,460	865,297	232,976	944,232	659,454	223,310	299,270	205,843	9,666	.....
1950										
Dec.	155,258	113,692	34,061	118,744	88,552	32,160	36,514	25,140	1,901	554,187
Total	1,459,382	1,042,884	261,357	1,081,162	788,619	243,215	379,220	254,265	18,142	.....
1951										
Jan.	174,056	124,002	42,805	135,086	98,197	37,790	38,970	25,805	5,015	675,385
Feb.	163,976	117,156	42,565	126,293	93,461	36,793	37,683	23,695	5,772	706,989
Mar.	190,665	134,184	44,196	148,884	107,745	39,492	41,781	26,439	4,744	779,717
Apr.	181,908	129,059	41,545	139,948	102,367	37,553	41,960	26,692	3,992	846,947
May	189,232	131,102	39,845	143,201	101,363	35,511	46,031	29,739	4,334	881,702
June	184,424	131,219	42,337	141,538	103,090	38,200	42,886	28,129	4,137	895,064
July	147,251	100,141	27,585	111,964	78,034	24,516	35,287	22,107	3,069	929,978
Aug.	177,096	128,981	41,763	130,913	99,732	36,086	46,183	29,249	5,677	944,211
Sept	160,695	116,658	35,500	120,632	89,771	33,086	40,063	26,887	2,414	918,038
Oct.	189,929	139,953	39,984	138,610	104,449	36,488	51,319	35,504	3,496	891,508
Nov.	176,728	131,276	35,094	126,544	95,180	31,099	50,184	36,096	3,935	865,029
Dec.	165,110	123,448	33,213	119,762	89,298	29,341	45,348	34,150	3,872	846,436
Total	2,100,970	1,507,179	476,372	1,583,375	1,162,687	415,955	527,695	344,492	50,457	.....

[1] Source: Bureau of the Census. [2] All cast iron pipe is shipped for sale. [3] For sale only.



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1951	1952
Jan.	668.0	404.5
Feb.	638.6	....
Mar.	599.0	....
Apr.	490.1	....
May	431.7	....
June	393.2	....
July	390.3	....
Aug.	404.5	....
Sept.	346.5	....
Oct.	372.4	....
Nov.	305.5	....
Dec.	230.5	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Ingot Brass and Bronze

(Shipments in net tons)

	1951	1952
Jan.	28,416	28,315
Feb.	27,168	.....
Mar.	31,997	.....
Apr.	30,472	.....
May	33,267	.....
June	33,817	.....
July	32,016	.....
Aug.	25,285	.....
Sept.	22,285	.....
Oct.	23,124	.....
Total for year	332,378	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1949	377,779	248,679	.....
1950			
Dec.	47,818	31,161	102,636
Total	536,398	341,833	.....
1951			
July	34,064	23,088	85,028
Aug.	37,321	22,985	80,588
Sept.	31,507	20,021	81,539
Oct.	36,565	22,608	76,589
Nov.	30,531	19,219	81,955
Dec.	26,998	17,028	77,308
Total	450,375	291,796	.....

Coke Production and Consumption

(Net tons*)

	Production	Consumption	
		Total	By Foundries
1949	63,637,429	63,462,233	2,778,868
1950			
Dec.	6,675,100	6,590,823	322,458
Total	72,718,038	73,373,618	3,523,396
1951			
Jan.	6,811,309	6,786,198	333,191
Feb.	6,008,154	6,045,800	293,169
Mar.	6,683,119	6,697,525	299,267
Apr.	6,471,316	6,335,793	357,018
May	6,730,122	6,716,780	367,946
June	6,567,640	6,638,043	324,758
July	6,629,863	6,495,585	301,447
Aug.	6,768,161	6,674,495	299,027
Sept.	6,470,658	6,366,969	274,017
Oct.	6,742,767	6,727,211	292,737
Nov.	6,501,098	6,562,279	272,338
Dec.	6,738,759	6,821,446	249,490
Total	79,122,966	78,868,124	3,664,404

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap		By Types of Furnace					
			Cupola		Air		Electric	
	Total	Purchased	Total	Purchased	Total	Purchased	Total	Purchased
1949	49,281,000	22,922,000	7,968,000	4,175,000	801,000	276,000	4,239,000	2,608,000
1950								
Dec.	5,361,000	2,600,000	803,000	418,000	122,000	44,000	600,000	361,000
Total	61,497,000	29,403,000	9,474,000	4,666,000	1,118,000	407,000	6,385,000	3,828,000
1951								
Jan.	5,975,382	3,010,300	1,009,142	533,705	110,004	41,116	684,484	435,633
Feb.	5,337,562	2,691,692	936,918	492,395	101,233	38,135	627,308	398,814
Mar.	6,187,520	3,100,622	1,064,325	558,833	108,513	39,260	728,786	463,371
Apr.	5,987,947	3,013,527	1,029,069	545,897	103,458	37,973	704,416	457,521
May	6,096,678	3,087,313	1,063,281	568,198	111,914	39,312	734,483	484,878
June	5,693,402	2,847,856	972,949	517,604	108,740	39,454	693,636	462,092
July	5,298,644	2,581,856	747,864	393,254	80,903	29,858	632,782	421,680
Aug.	5,614,535	2,721,287	918,180	487,085	104,809	37,592	720,020	475,190
Sept.	5,377,491	2,585,665	811,332	427,035	93,166	33,640	688,941	460,446
Oct.	5,869,590	2,828,221	951,406	504,804	102,950	38,534	750,915	489,217
Nov.	5,596,368	2,699,556	847,991	451,591	90,302	33,795	738,589	489,999
Dec.	5,483,089	2,656,536	738,150	398,538	87,748	32,430	687,559	450,155
Total	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,005

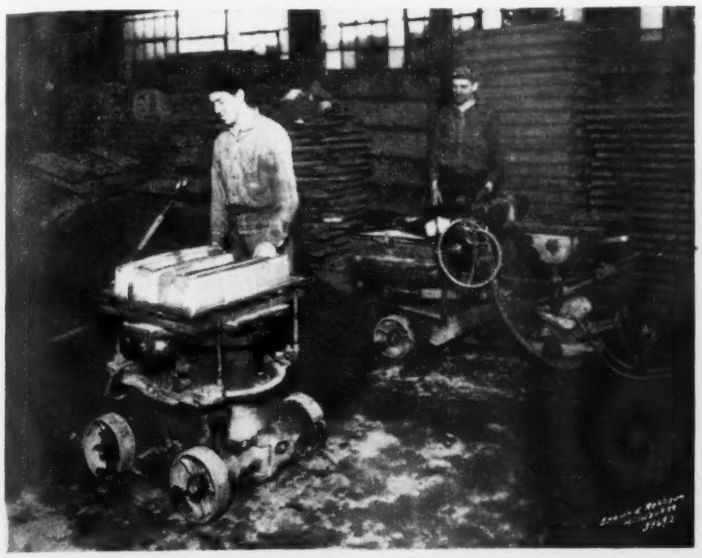
Pig Iron Production and Consumption

	Production** (Standard grades—1000 net tons)					Consumption* (By type of furnace, 1000 gross tons)			
	Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Total	Cupola	Air	Electric
1950	64,589.1	2,870.4	3,034.2	50,450.5	8,234.0	58,416	5,475	319	326
1951									
Jan.	5,801.7	300.0	233.3	4,529.8	738.6	5,367	542	32	11
Feb.	5,084.8	238.7	226.0	4,007.2	612.9	4,725	492	29	10
Mar.	5,919.3	267.9	276.5	4,647.5	727.5	5,406	550	33	15
Apr.	5,812.2	259.1	261.0	4,575.8	716.1	5,281	516	31	11
May	6,104.9	282.0	259.4	4,777.0	786.5	5,522	533	31	11
June	5,911.3	254.2	276.5	4,631.9	748.7	5,348	486	30	11
July	5,994.8	280.4	250.0	4,702.8	761.6	5,317	378	23	10
Aug.	5,988.6	252.7	264.4	4,723.3	758.2	5,358	465	30	11
Sept.	5,811.6	257.7	243.7	4,576.8	733.4	5,266	431	27	12
Oct.	6,112.6	260.6	299.4	4,777.4	775.2	5,601	489	31	14
Nov.	5,824.5	285.5	269.0	4,532.1	737.9	5,287	448	29	9
Dec.	5,898.1	247.4	257.5	4,653.0	740.2	5,282	401	28	11
Total	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
Jan.	5,964.3	233.1	285.8	4,672.3	773.1	....	...	...	...

* Source: U. S. Dept. of Interior, Bureau of Mines. ** Source: American Iron & Steel Institute. [1] Source: Bureau of the Census. [2] For sale only.

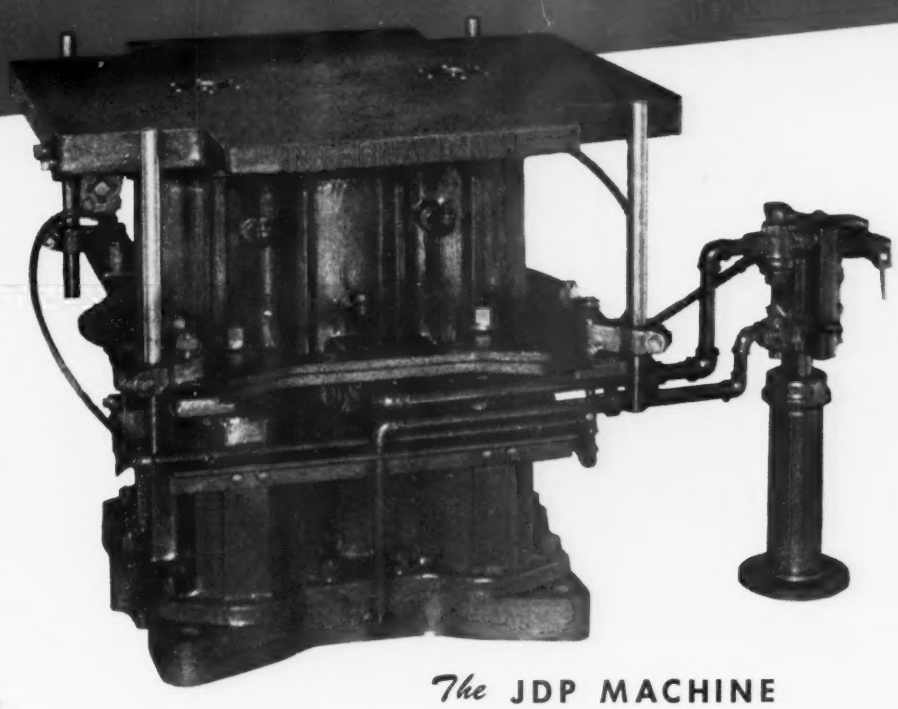
INTERNATIONAL TYPE

JDP MACHINE



The JDP has the exclusive Double Jolt Feature. A **Positive** Jolt and a **True** Ram.

TWO JOLT SECTIONS combined in one integral unit.



The JDP is adaptable to a large range of work, suitable to the pin lift style. It is readily adjustable. The incorporation of the Double Jolt Feature, combined with the sturdiness of the machine, gives a positive ram throughout the mold.

The lifting section is guided by hardened steel parts for long lasting wear. All valves are conveniently located for ease of operation. Wearing parts can be readily replaced.

The JDP MACHINE

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OPS Industry Advisory Committees

MEMBERS of various foundry and related industry advisory committees appointed by the Office of Price Stabilization, Washington, are listed below. These committees are intended to serve in an advisory capacity to OPS in the latter's establishment of regulations affecting prices of the industry's products. Members of similar committees appointed by the National Production Authority were listed in March FOUNDRY, page 262.

GRAY IRON CASTINGS

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C. R. Culling, president, Carondelet Foundry Co., St. Louis
H. L. Edinger, president, Barnett Foundry & Machine Co., Irvington, N. J.
Philip Frankel, secretary-treasurer, Superior Foundry Inc., Cleveland
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S. D. Russell, president, Phoenix Iron Works, Oakland, Calif.
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E. E. Burk, vice president, Lancaster Malleables & Steel Corp., Lancaster, N. Y.
Wm. E. Butts, president, General Metals Corp., Los Angeles, Calif.
C. I. DeShong, president, Oriskany Malleable Iron Co., Inc., Oriskany, N. Y.
C. A. Gutenkunst, Jr., president, Milwaukee Malleable & Gray Iron Works, Milwaukee, Wis.
F. O. McDermott, International Harvester Co., Farm Implement Division, Chicago
Gordon Nash, plant accountant, Albion Malleable Iron Co., Albion, Mich.
James E. O'Brien, Fanner Co., Cleveland
Frank C. Tuttle, Jr., president, Belcher Malleable Iron Co., Easton, Mass.
John A. Wagner, president, Wagner Malleable Iron Co., Decatur, Ill.
R. G. Parks, comptroller, National Malleable & Steel Castings Co., Cleveland
A. H. Zick, secretary-treasurer, Auto Specialties Mfg. Co., St. Joseph, Mich.

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N. K. Anderson, president, Alloy Steel & Metals Co., Los Angeles
B. J. Gross, president, Key Co., East St. Louis, Ill.
Claude L. Harrell, vice president, Sterling Steel Casting Co., East St. Louis, Ill.
G. R. Casey, president, Treadwell Engineering Co., Easton, Pa.
A. T. McKee, vice president, Strong Steel Foundry Co., Buffalo
E. L. Altenburg, vice president, Atlas Steel Casting Co., Buffalo
J. D. Hagans, works sales manager, The Ohio Steel Foundry Co., Springfield, O.
John B. Fleeger, vice president, Oklahoma Steel Castings Co. Inc., Tulsa, Okla.
A. M. Andorn, executive vice president, Penn Steel Castings Co., Chester, Pa.
M. A. Fladoes, president, Sivyer Steel Casting Co., Milwaukee, Wis.
I. K. MacGregor, vice president, Campbell, Wyant and Cannon Foundry Co., Muskegon, Mich.
T. F. Dorsey, president, Pittsburgh Steel Foundry Corp., Pittsburgh
R. C. O'Kane, vice president, The Buckeye Steel Casting Co., Columbus, O.
James Suttie, vice president, American Steel Foundries, Chicago

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Harvey T. Harrison, vice president, The Duraloy Co., Scottdale, Pa.
G. A. Baker, vice president, Duriron Co. Inc., Dayton, O.
B. J. Gross, president, Key Co., East St. Louis, Ill.
F. M. Fahrenwald, president, The Fahralloy Co., Harvey, Ill.
Edgar C. Hummel, president, Utility Steel Foundry, Los Angeles

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Grant Roth, president, Ace Foundry Co., Chicago
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Anthony Cristello, vice president, American Light Alloys Inc., Little Falls, N. J.
Otto G. Gundel, Buckeye Brass and Mfg. Co., Cleveland
H. C. Fechtmeyer, controller, Ampco Metal Inc., Milwaukee
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C. E. Piper, president, Erie Bronze Co., Erie, Pa.
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A. W. Simpson, III, president, Western Die Casting Co., Emeryville, Calif.
R. C. Cornell, vice president, Litemetal Dicast Inc., Jackson, Mich.
W. G. Newton, Jr., vice president, Newton-New Haven Co., West Haven, Conn.
Walter M. Goldhamer, vice president, Superior Die Casting Co., Cleveland
Matthew M. Berman, president, L. E. Mason Co., Hyde Park, Mass.
E. J. Soule, assistant to executive vice president, Stewart Die Casting Division, Stewart-Warner Corp., Chicago
R. A. Luedtke, president, Schultz Die Casting Co., Toledo, O.
George Souther, Electric Auto-Lite Co., Die Casting Division, Woodstock, Ill.
Arthur G. Chase, president, Precision Castings Co. Inc., Syracuse, N. Y.

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Alex Miller, Columbia Iron & Metal Co., Cleveland
Barney L. Keywell, Samuel G. Keywell Co., Detroit
Leo J. Kelleher, Southern Converting Co., Greensboro, N. C.
C. C. Cohen, I. J. Cohen & Co., Kansas City, Kans.
Max L. Kimerling, M. Kimerling & Sons Inc., Birmingham
Marshall A. Shapiro, California Metals Co., Oakland, Calif.
Leon Goldstein, Paper-Calmenson & Co., St. Paul
A. W. Snyder, Bethlehem Steel Co., Bethlehem, Pa.
R. [illegible], chairman, National Auto Wreckers Assn. Inc., Chicago
Walter Erman, Erman-Howell Div., of Luria Steel & Trading Corp., Chicago
C. A. Ilgenfritz, U. S. Steel Co., Pittsburgh
Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.
F. H. Hanfelder, American Steel Foundries, Chicago
W. W. MacMillen, National Malleable & Steel Castings Co., Cleveland
W. W. Kelly, Atcheson, Topeka, & Santa Fe Railway, Chicago
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George Striebing, Pickands Mather & Co., Cleveland
Carl E. Hilkert, Manager, Pig Iron Division, Republic Steel Corp., Cleveland
Edwin Jones, chairman, Globe Iron Co., Jackson, O.
Joseph Treanor, Mystic Iron Works, Everett, Mass.
Walter T. Moreland, vice president, sales, Lone Star Steel Co., Dallas, Tex.
L. A. Watts, Colorado Fuel & Iron Corp., New York
James MacBeth Jr., U. S. Steel Corp. of Delaware, Pittsburgh
Donald MacArthur, Kopper's Co., Granite City, Ill.

Book Review

Foundry Practice by William H. Salmon and Eric N. Simons, with illustrations by E. G. Gardner; hard cover; 354 pages 5½ x 8½ in.; Published by Isaac Pitman & Sons Ltd., London; distributed in America by Pitman Publishing Corp., 2 West 45th street, New York 19, N. Y., Price $6.50.

This new and comprehensive treatment of foundry work provides not only a practical guide for operatives, but also an authoritative textbook of the subject covering the syllabus of the City and Guilds of London Institute for intermediate students and including specimen examination questions.

In addition to the text, illustrations and index, the book presents a 19-page bibliography of books dealing with various phases of the foundry industry.

General scope of the work may be gathered from the chapter headings: I—The Blueprint; II—The Pattern; III—The Mould Materials; IV—Sand Mixing and Distribution; V—Moulding and Coremaking; VI—Mould Drying and Core Baking; VII—Closing and Pouring The Moulds; VIII—The Cast Metal; IX—The Molten Metal; X—Fettling Operations; XI—Heat Treatment; XII—Quality Control. Appendix *A* contains the examination and answers to questions. Appendix *B* contains the bibliography and a six page index.

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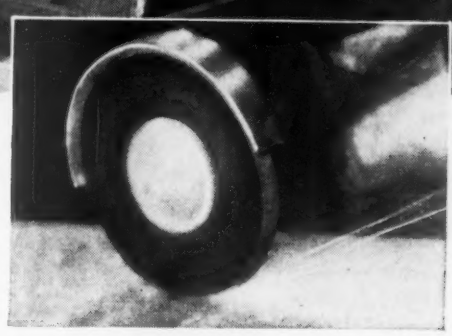

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AROUND THE COUNTRY

News Reports from . . .

Los Angeles

STRETCHING out of aircraft production schedules that postpone target dates for the build-up in air power from mid-1954 to 1956 has affected nonferrous foundries in this district. Particularly hurt were aluminum foundries, some of which are running at 50 to 60 per cent capacity compared with more than 100 per cent prior to the rescheduling.

Magnesium foundries supplying sand castings to aircraft manufacturers have been harmed relatively little. Most have six-months' backlogs and could be sold out for the next 12 months if all orders offered them by the aircraft industry were accepted. On 9-hour, 5½-day work schedules magnesium foundries are as busy as they want to be. Only effect of the rescheduling, they say, is a reduction of potential business.

With greater emphasis on magnesium castings in aircraft and guided missiles more foundries are coming into the field. Stimulated by increasing aircraft production requirements the number of magnesium foundries in this district has doubled since Korea. About 10 per cent of castings used in aircraft are magnesium and the percentage is constantly rising. The demand is expected to increase when large-scale missile production gets under way at Consolidated Vultee's Guided Missile Division plant at Pomona.

Foundry labor is plentiful and workers of all grades are knocking on doors of foundry employment offices. Reduction of working forces has been heavy at pipe foundries and some nonferrous foundries have recently been trimming employment rolls.

Pressing problem for most plants is lack of work. The shortage of orders is most pronounced for foundries specializing in light castings for civilian products. Foundries serving manufacturers of strictly civilian products generally find their business volume down 25 per cent from the level of six months ago.

Material supplies continue to ease. Cast scrap is selling at $3 below ceiling, and coke is abundant. However, careful observers doubt whether materials other than scrap, coke and pig iron are really freer.

Kaiser Steel Corp.'s Fontana Works will boost pig iron output by 50 per cent as part of a $65 million expansion program. A third blast furnace to be added will produce 438,000 tons of pig yearly. The hot-metal to come from the new furnace will make Fontana less dependent on scrap and at the same time will permit sale of pig iron to western foundries.

Chicago

A RISING volume of orders for castings is lifting many gray iron jobbing foundries out of the slump that overtook them late last year. Whether it is a permanent upsurge or one that could slip off again is the $64 question. On the answer hinges the well-being of a big segment of the gray iron industry in 1952.

The shops hardest hit with declining orders, of course, were those serving manufacturers of civilian hard goods, but even those where output goes into defense and defense-support uses also suffered. Despite shortages of pig iron and alloys, foundries were producing and delivering castings at a good clip and purchasers discovered their inventories building up too fast. Thus, orders were cancelled, cut back or slowed down. There is a suspicion, too, that some orders had been placed in duplicate just to insure deliveries. Now that the inventories have been worked down to reasonable proportions, ordering of castings has been resumed.

Late in January the upturn began; it continued through February, and it gained further headway in March. A number of shops now have restored melting to five days a week, a level considered satisfactory.

A good many gray iron shops continue to suffer from effects of NPA limitation restrictions on production of civilian goods, such as autos and household appliances. Most of the restrictions remain in effect, but prospects for some relaxation are becoming brighter.

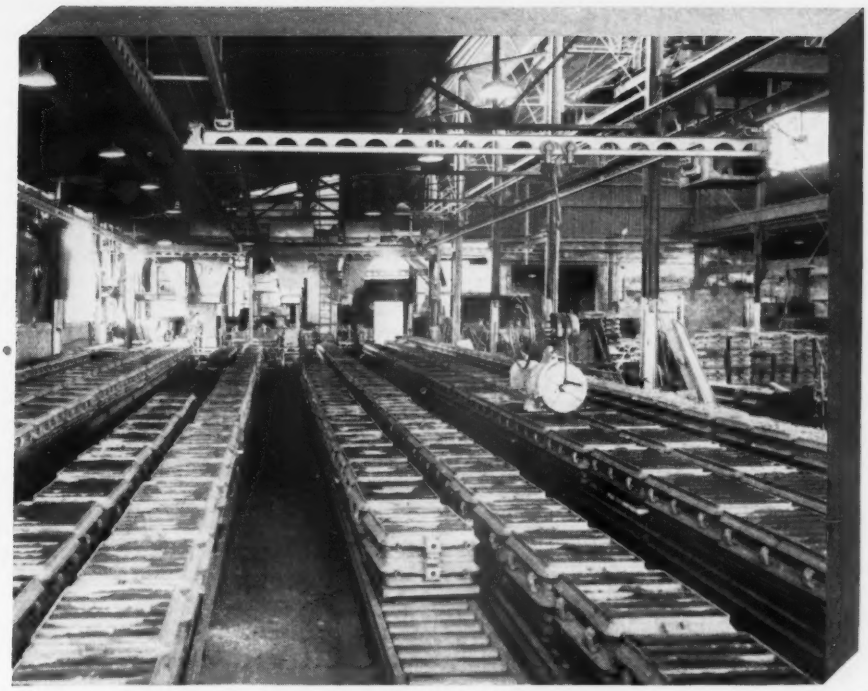
Currently, there's enough pig iron to meet all needs. It could get tight again, since the margin between supply and demand is slim. Coke is plentiful and no shortage is anticipated. Cast scrap has become abundant and some time will be required to consume the surplus offered for sale. Alloys remain tight but have caused no hardship recently. Skilled labor, such as molders and coremakers, is somewhat short, but not critically so. Enough common labor is available.

Detroit

CUTBACK in aircraft procurement schedules has played hob with some automotive manufacturers' expansion plans and simultaneously has written off some large chunks of foundry equipment business. The foundry industry is abuzz with scuttlebutt about Chevrolet's Tonawanda, N. Y., expansion, the largest portion of which is accounted for by a 370,000-sq-ft foundry.

Report has been circulated that this foundry was cancelled in its entirety. This, says Chevrolet brass, is not true. Only the magnesium casting facilities

(*Continued on page* 148)



a mechanized foundry benefits everyone

● In the Foundry Industry, as in all others, the advantages of mechanization are far-reaching. The production of more and better castings, at less cost, which is made possible by modern foundry equipment, benefits the foundry employees, management, the shareholders or owners and the purchasers of the products on which the castings are used. It might be an automobile, a home appliance, an outboard motor, a farm implement or any one of a thousand products which are made better by the use of castings. The application of modern foundry equipment, and the efficiency and economy which it creates, is bringing more good things within the reach of more people.

Well-planned conveyer systems are usually pretty important in foundry mechanization programs. Today, Mathews Engineers are making available to American and Canadian Foundrymen the benefit of long experience with foundry conveying problems. This, and the facilities of three modern plants, is yours for the asking. Write or wire today for catalogs. Engineers in all principal cities.

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(*Continued from page* 146)

have been dispensed with, the new gray iron foundry being unaffected. It is understood that enough magnesium foundry capacity is available elsewhere to permit production of Wright R-3350 engines on the reduced schedules now called for by the Air Force and Navy. With General Motors' money being used, the magnesium phase of the program was not considered sufficiently justified in view of the cutback.

* * *

The light metals, particularly as castings, may be expected to play an increasingly important part in automotive vehicles. Any number of instances pointing the way can be cited. Many of the applications are as yet experimental. But some of these hold great promise, cost and performance-wise. Two companies, Aluminum Co. of America and Dow Chemical Co., explained some of the automotive developments in these metals to a Society of Automotive Engineers meeting in Detroit last month.

One of Alcoa's most interesting experiments is with a cylinder head for an overhead valve engine, in which the coring presents some difficult problems when casting iron and raises its price substantially. Alcoa's solution is a head made in slices with permanent-mold high-production equipment, the layers being brazed together to form a one-piece head. Similar procedure is used to make cylinder blocks and crankcases, the slices being vertical at about the centerlines of the bores. As to costs, Alcoa men explain there are no aluminum foundries running at the high production rate which the automotive requires so there is no exact means of cost determination but they believe an aluminum foundry with the highest degree of mechanization and its brazing facilities similarly developed could produce aluminum brazed assemblies at a cost comparable with integrally cast iron parts.

The magnesium men are equally optimistic about their ability to compete. In the transportation field, aircraft last year was the largest magnesium consumer, with trucks and trailers in second place, and passenger cars third. In rate of growth, however, the order is reversed.

Practical where its lightness carries enough of a premium to offset the higher material cost, cast magnesium is viewed as having a bright future in commercial vehicle wheels and several other parts. Weight limitations on highway transport vehicles make every pound saved important in terms of allowable payload. An experimental magnesium tank truck of 6000-gal capacity, for example, carries a legal payload nearly 20 per cent greater than a conventional steel trailer of the same gross weight.

* * *

Slippage in output of gray iron and malleable foundries appears now to have been halted, and second quarter operations of those catering to automotive manufacturers will be fractionally better.

For materials suppliers the pessimism is not yet gone, however. More production capacity is being opened for pig iron, ferroalloys and coke, and unless overall foundry activities improve materially intense competition for foundry business is ahead. An important supplier of foundry materials here has told his home office he sees very little chance of this area taking its proportionate share of the increased output of which his expanded plant is now capable of producing. Much ballyhooed new defense contracts in this area are but drops in the bucket compared with the cutback in automaking operations.

Employees Attend Foundry Technology Course

NINETEEN employees of Superior Foundry Inc., Cleveland, recently attended a class in foundry technology under the direction of James Goldie, instructor at Cleveland Trade School. Sponsored by the company, the 15-week course included a study of sand requirements for foundry work, molds and molding methods, gating and risering, casting defects, cupola practice, effect of elements in iron, alloys, coreroom practice, and raw materials.

At a graduation dinner Jan. 15 at Hotel Carter, Mr. Goldie presented each student with a certificate of accomplishment. Walter L. Seelbach, president, Superior Foundry, presented each man with an initialed belt, and entertained them with an illustrated account of his recently completed tour of Europe.

Those who attended the class are, left to right: William Hampton, James Goldie (instructor, standing), Paul Schweitzer, John Sibbison, Nick Strogonow, Joseph Panzuto, Arthur Sauline, Edward Petrick, Jerry Novotny, Albert Supik, George Montowski, Arthur Jaworski, William Nowak, Byron Kennel and Alfred Ward. Not in the photo: Howard Schaffer, John Balsay, Stanley Hemel, Leonard Kasco, and Harold Wheeler, photographer

Philadelphia

DISTRICT gray iron foundry operators believe they have rounded bottom. Recently there has been a slight improvement, with shops now averaging around 70 per cent of normal. Prominent in recent gains are foundries producing the larger castings, 1000 pounds and over, for machine tools and other types of capital equipment.

While not expecting the volume of business done last year, most gray iron operators look for a further increase before business again levels off. Soil pipe producers expect a definitely better period in April and May on the assumption there will be a seasonal increase in building activity. Easing in government restrictions on civilian needs should provide small casting makers with better demand.

Direct defense work continues light; probably not averaging more than 5 per cent of the tonnage now being booked by gray iron foundries. Indirect defense, including machine tools, may account for as much as

(*Concluded on page* 153)

Get the Advantages of a *Really* PORTABLE MULLOR

(With spring-loaded mulling wheels since 1944)

Real Portability—only the sand need be moved . . . not the entire mullor. The Mulbaro provides real ease and convenience.

Sand Is Handled Only Once—that's when it is placed in the barrow for mulling. Mulled sand is moved to the molder or coremaker in the same barrow.

Knee-High Barrows for Easy Loading—no need to raise the sand to a waist-high crib opening. Barrows may be loaded from any side or from overhead bin or hopper.

Use Two or More Barrows With One Mulbaro—when a batch is mulled, move the barrow out and move a second into mulling position. Then, mull the second batch while the first is moved to molding floor or core bench.

Short Time Cycles, Real Mulling Efficiency—only the Mulbaro offers modern mullor design in a portable machine. Light-weight, rubber-tired, spring-loaded mulling wheels; high-agitation plow design, and hemispherically shaped barrow bowl insure complete mulling of core or molding sand in short time cycles.

The MULBARO

Write today for complete information!

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Div. Pettibone Mulliken Corp.
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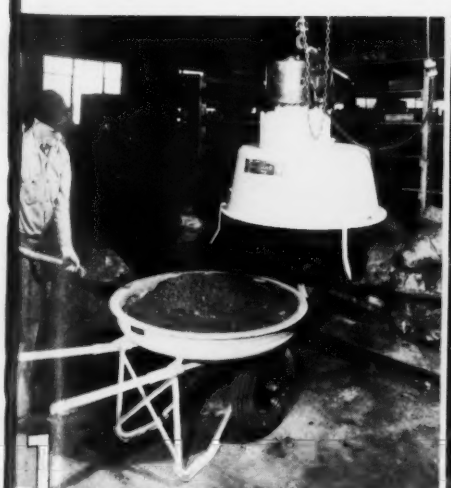
Chicago 39, Illinois

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS



1 The Mulbaro couldn't be easier to operate. Just load the knee-high barrow from heap or overhead storage bin . . . the sand need be handled only once.

2 Lower the mulling mechanism, turn on the machine . . . and the mulling is completed in four minutes or less.

3 Move the barrow with the batch of mulled sand to any location in the foundry. No time wasted in loading and unloading!

INCREASE PRO

A high production CHAMPION *unit. . . with a* J&J ROLLOVER

GOLDEN FOUNDRY of Columbus, Ind., has found today's answer to higher production, quality, and economy with Beardsley & Piper equipment!

A high-production Champion CB-400 Core Blower produces up to 180 fifty-pound diesel engine barrel cores per hour. Other coremaking jobs are handled with comparable efficiency.

A Johnston & Jennings Rollover machine was chosen for this high-production unit after a careful study of all rollover machines on the market. The J&J Rollover cycle was found to be the fastest and—once installed—it proved itself on the job.

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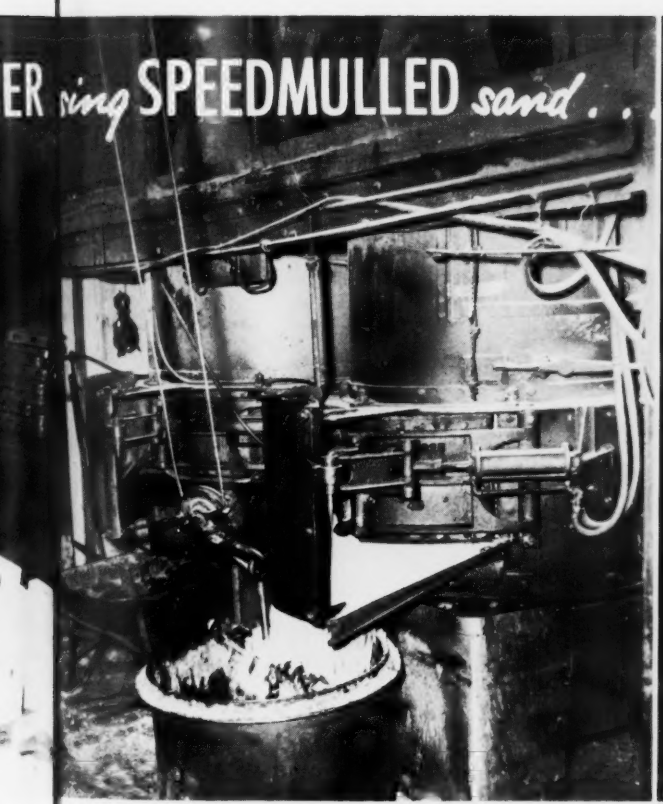
FOUNDRY EQUIPMENT MANUFACTURERS ASSOC. INC. MEMBER FEMA

DUCTION NOW—

as Golden Foundry did !

ER *using* SPEEDMULLED *sand . .*



Two Model "40" Speedmullors provide all the mulled core sand. Installation of these Speedmullors followed successful use of other Speedmullors in the plant. A Model "80" has also been recently installed with a new molding unit.

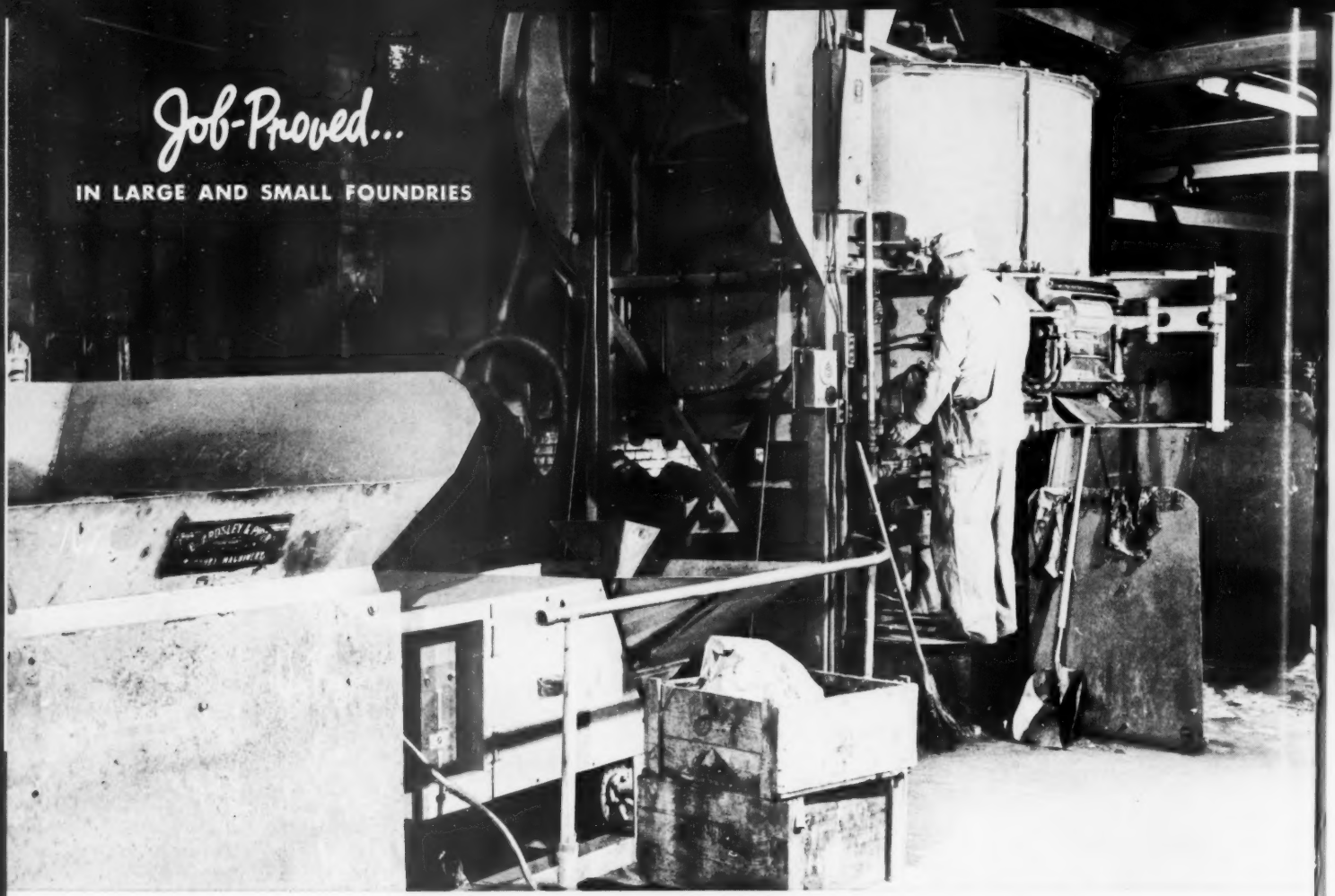
makes cores for SLINGER *rammed molds*

To keep pace with the high-production coremaking unit, Golden uses a Tractor Sandslinger to ram large molds. Here is another progressive foundry that's thoroughly sold on B&P machines.

LOOK TO

BEARDSLEY & PIPER

FOR BETTER METHODS



Job-Proved...

IN LARGE AND SMALL FOUNDRIES

All the Advantages of a Complete Sand System...

at a fraction of the cost!

B&P COMBINATION UNITS...

PREPARATOR *plus* SPEEDMULLOR

MEMBER FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. FEMA

JOB-PROVED IN LARGE AND SMALL FOUNDRIES throughout the country, B&P Combination Units provide many features of a mechanized sand preparation and handling system at but a fraction of a system's initial cost.

With this Combination Unit, *your* foundry can have the profit-making advantages of completely prepared, fully mulled molding sand with controlled physical properties, and you'll also obtain these added benefits:

- *Higher quality castings with improved surface finish*
- *Lower material costs—fewer expensive bonding additives required*
- *Lower labor costs—higher productivity per molder and per man-hour*
- *Better utilization of man-power—men removed from laborious sand-cutting jobs—used to real advantage in other departments*

Write today for more information!

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LOOK TO

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FOR BETTER METHODS

(*Concluded from page* 148)

20 per cent for the gray iron shops as a whole, with some of the larger foundries benefiting by substantially more than this percentage average.

Malleable business is slowing down a bit, but foundries are still operating at a good rate, possibly 80 to 90 per cent of normal capacity. Railroad requirements are off, as also are needs of the automotive industry. Farm equipment requirements are holding up fairly well, however, and while demand for malleable fittings has been down for some little time, it should benefit by an increase in building operations this spring.

Steel foundries are operating at fully 100 per cent of normal and even above in some instances. Power facilities and other capital goods expenditures are contributing materially to steel casting demand; also quite a bit of tonnage is going into armor plate. Two plants in this district plan additions for the production of armor plate. Most steel foundries report an increase in order backlogs.

Raw material supply for district foundries generally has improved, this applying to both pig iron and scrap. In general operators regard supply as adequate. Skilled labor remains scarce, with common labor still plentiful.

APART from those engaged in heavy work, machine tool castings in particular, district gray iron foundries are still operating at a restricted rate of not more than four days a week and in some instances less. However, these small shops are not losing further ground and are contemplating at least some improvement over coming weeks. They are encouraged by signs of easing governmental restrictions on civilian products which might mean more in the way of small castings for washing machines, refrigerators etc.

Requirements for machine tools and other types of heavy equipment are expected to undergo further expansion, thus insuring a continuation of good operations at the larger plants. Steel and malleable shops are in uniformly better position than the gray iron plants. This is particularly true of steel foundries, which are operating at virtual capacity.

Business at the nonferrous shops remains generally sluggish, although operators are encouraged over prospects for a somewhat easier flow of metals for civilian requirements. Defense requirements remain light.

It's the Unusual Features of

Milwaukee CHAPLETS

that Insure Instant Fusing in any Casting

It's the sharply cut "thread stem" design that insures instant fusing. Metal melts at the edges first, that's why the sharp edges "burn in" quickly and completely to insure instant fusing which results in freedom from leakers. As the fusing cycle slows up through the base of the thread and into the stem itself, there is ample time for adequate and proper core support. Here is a design where fusion takes place at exactly the right speed to give you both instant fusion plus proper core support.

Write for Samples and Prices

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By EDWIN BREMER

Foundry DEVELOPMENTS

PREDICTION of the Research and Development Board, Department of Defense, is that total research and development expenditures in the United States during 1952 will be $2.93 billion. Of this, $1.64 billion will come from the government. Use of funds by type of institution is $1.82 billion by industry, $280 million by universities and $830 million by government. Increase over 1951 is about 13 per cent.

* * *

INCREASING light available from fluorescent lamps by 40 per cent is said to be accomplished by a new system under development by the Lamp Division, General Electric Co. Employing 360 instead of the common 60-cycle frequency, small capacitators replace the heavier ballasts, and a magnetic converter operating similar to a transformer, changes the frequency from 60 to 360-cycle.

* * *

ACCOMPANYING illustration shows use of radioactive cobalt or Co^{60} at Empire Steel Castings Inc., Reading, Pa., in radiographic examination of castings. The isotope, in the form of a piece of wire, is mounted in a circular holder and elevated over the casting at a height determined by the thickness of the steel. Gamma rays emanating from the Co^{60} will penetrate from ½ to 6 in., and the exposure range is from ½ to 5 or 6 hr. Isotope has a half-life of 5.3 years, but can be used up to 10 years with diminished efficiency after the half-life period.

Operator is placing radioactive cobalt in position to make radiagraph

* * *

THERMAL indicators developed by the Army Quartermaster Corps are capable of instant temperature readings from 115 to 500° F, and consist of white pigment coating on black paper. Coating can be designed to melt at any definite temperature when the white pigment melts into the paper base, leaving a black background. Materials used are readily available, and commercial production should bring the cost of thermal indicators down to a few cents each.

* * *

NEW TECHNIQES to help metallurgical industries produce better high-temperature alloys, more durable turbine blades and better steels, just have been made available, according to Office of Technical Services. Abstracts from and information on reports on scientific and technical research done by the federal government or with the government's financial support, and cleared of secrecy restrictions, are available in the January issue of *Bibliography of Technical Reports*. This sells for 50 cents and may be secured from Office of Technical Services, Department of Commerce, Washington 25, or from Department of Commerce field offices.

* * *

RECENT investigation by National Bureau of Standards provides valuable information on effect of nitrogen on the brittleness of certain carbon steels at low temperatures. Results of fracturing V-notch specimens in Charpy impact tests indicate that increased nitrogen, if present as aluminum nitride, improves the low-temperature notch-toughness—lowers the temperature at which brittleness appears—in the steels studied. However, nitrogen in the form of nitrides of iron or manganese is apparently detrimental from the same standpoint. Study was conducted by G. W. Geil, N. L. Carwile and T. G. Digges of NPS thermal metallurgy laboratory, and details of the work are available in *Journal of Research*, National Bureau of Standards, March issue

* * *

ACCORDING to Thermoid Co., Trenton, N. J., life of conveyor belting depends upon the following five conditions of loading: Loading material should discharge at the same speed and in the same direction as that of belt movement. Lumpy material should be cushioned on belting by a pre-laid layer of fines. Chute discharge should strike between closely spaced carrier pulleys; where heavy material is encountered it should strike directly over rubber-covered or pneumatic idlers. Falling distance from chute to belting as well as discharge velocity of material should be minimized. Chute construction should be such as to settle the load porperly without allowing spillage or jamming of material around the chute outlet.

* * *

PERMANENT mold casting of brasses high in zinc usually results in accumulation of a drossy mixture of zinc and zinc oxide on the mold surfaces, but that can be overcome according to Robertson and Browse in British Patent No. 641,583 by use of a coating containing a metal oxide capable of being reduced to a lower oxide by zinc at the pouring temperature. Coating suggested is an aqueous suspension of manganese dioxide mixed with an alcoholic solution of tannic acid.

* * *

CELLULOSE gum, used by German foundrymen as a core binder, now is available in this country. Technically the material is the sodium salt of carboxymethylcellulose having a closely controlled number of sodium carboxymethyl groups introduced into the cellulose molecule to bring about solubility in water. Advantages of cellulose gum as a binder are said to be the small amount required, low drying or baking temperatures, good hot strength, low decomposition temperature and low gas evolution. It is claimed that as little as 0.25 per cent gum dissolved in 4 per cent water (both on sand basis) yielded cores having as high as 0.55 psi green strength, 68 psi baked strength and 57 hardness. Inclusion of a small amount of calcium oxide in the core mix reduced sensitivity to storage of baked cores at high humidity.

IF your present conveyors aren't doing a PERFECT job—

INVESTIGATE this amazing NEW CONVEYOR!

If your product is too hot, sharp or oily for belt or flight conveying, or too abrasive and sticky for screw or apron conveying — if you're getting excessive spillage, or if you have cleaning problems, etc. — *you owe it to yourself to investigate the Carrier Natural-Frequency Conveyor.*

These revolutionary conveyors are an entirely new *type* of vibrating equipment which substitutes Natural-Frequency spring action for brute force. Where "brute-force" conveyors may use up to 90% of their power to operate their moving parts and only about 10% to convey their loads, *the Natural-Frequency Conveyor uses substantially no more power to operate, empty, than is required to run the motor alone.* Result:

LESS POWER REQUIRED
(1000 foot-tons per hour per H.P.)

LESS MAINTENANCE & DOWN-TIME
(Less power + good design = good service)

GREATER CAPACITY
(From a dribble up to 200 tons per hour)

HIGH CONVEYING SPEED
(Up to 100 feet per minute, on flat hauls)

NO DAMPENING UNDER LOAD
(Designed with extra power for specified load, with positive stroke)

SELF-CLEANING
(Continuous smooth trough — no pockets)

SCREENS, DEWATERS, SEPARATES, BLENDS, DRIES, COOLS
(Combines processing with conveying)

WIDTHS FROM 6″ TO 48″; LENGTHS FROM 5′ ON UP
(With pans 16 gauge to ½″ plate or heavier, open or enclosed)

BALANCED, VIBRATION-FREE UNITS AVAILABLE
(For use on ceilings or light floor construction)

Carrier Natural-Frequency Conveyors (including vertical vibrating spiral types) are now being used in dozens of the largest companies in America. Write for Bulletin 102, *today.* Carrier Conveyor Corporation (formerly Whitley-Carrier Co.), Frankfort Avenue at Clifton, Louisville 6, Kentucky.

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SOUTHEASTERN REGIONAL CONFERENCE

Has Record Attendance at Birmingham

By WILLIAM G. GUDE
Managing Editor
FOUNDRY

AN INTERESTING and informative program was presented at the successful twentieth annual Southeastern Regional Foundry Conference held at the Tutwiler Hotel, Birmingham, Feb. 21-22. For the first time, the Tennessee Chapter of the American Foundrymen's Society joined with the Birmingham District Chapter and the University of Alabama Student Chapter in sponsoring this meeting. Total registration exceeded 650 for a new attendance record.

Eight technical papers were included in the program, which was arranged by a committee headed by Fred K. Brown of Adams, Rowe & Norman Inc., Birmingham. At the first session, presided over by Charles B. Saunders, Tennessee Products & Chemical Corp., Nashville, Tenn., a detailed discussion of the use of welding in the steel foundry was presented by Paul H. Stuff, Ross-Meehan Foundries Inc., Chattanooga, Tenn.

Mr. Stuff discussed the care that must be taken—particularly in preheating—in both repair welding and fabrication of parts by the welding process. Excessive temperature in preheating should be avoided, the speaker indicated, although low-carbon and low-alloy steels require little or no preheating because they are not prone to cracking. Chemical composition, thickness and shape of the casting also are factors in the selection of preheat temperature. Mr. Stuff described the various weld techniques commonly employed and pointed out the necessity for careful selection of the type of rod used. Since castings are as easily welded as is wrought steel, the welding process provides the opportunity for joining castings with wrought material as well as with other steel castings to simplify the fabrication of various types of parts.

The method of fabrication to be used in any instance depends on various considerations, including the number of parts involved, cost of patterns, jigs, fixtures, etc. The cast-weld assembly frequently reduces use of cores, also simplifies cleaning operations, and provides better dimensional control and total cost, thereby putting steel foundries in a more competitive position with other methods of fabrication.

In his usual effective manner, Fred G. Sefing, International Nickel Co. Inc., New York, presented a comprehensive discussion on "The Why of Gate and Feeder Design of Castings." Mr. Sefing showed examples of improper location of gates, and emphasized the importance of having the coldest metal and the thinnest sections the farthest from the sprue. He also recommended the use of strainers to obtain clean metal, the avoidance of turbulence, and the taking of metal from the bottom of the runner.

There is nothing wrong with fast pouring, the speaker indicated, provided too much metal does not pass one point and erode the sand. Metal temperature should be watched, and this means the temperature at the mold, not at the cupola spout. Cross-sectional areas of gates, runners and sprues should be selected carefully, so that metal does not leave the runner faster than it is entering and thereby cause slag to enter the mold cavity.

Tests have shown, the speaker said, that approximately 20 seconds after pouring a mold is the critical period for gas formation. Pressure is at its highest at that time.

Fred K. Brown, Birmingham District Chapter vice chairman, presided at the Thursday luncheon at which the principal speaker was I. R. Wagner, national vice president, AFS, and director, Electric Steel Castings Co., Indianapolis. Mr. Wagner spoke in detail concerning various activities of the AFS, praising the efforts of those individuals who serve on national committees and in the work of 52 chapters. He also discussed the International Foundry Congress and Show to be held at Atlantic City next May.

First speaker at the second technical session was Prof. Warren C. Jeffery, University of Alabama, who gave results of tests comparing the effectiveness of different core binders. M. L. Carl, Sloss-Sheffield Steel & Iron Co., Birmingham, was the session's chairman. Professor Jeffery's

(*Continued on page* 158)

A capacity audience attended the annual banquet of the Southeastern Regional Conference in Birmingham

Save up to 80% on Core Box Replacement Costs!

NOW... Cheaper To Replace Than To Repair

DUPLICAST

TRADE MARK REGISTERED.

"The Expendable Core Box"

Duplicast is the ideal core box for high production schedules and for complicated irregular contoured shapes and cavities which otherwise are costly to replace or repair. Duplicast core boxes are made of a wear resistant aluminum alloy by a patented method in which a permanent hob, or mandrel, is used to duplicate any number of core boxes of exact dimensions within plus or minus .003 inches within a distance of 12 inches. Every Duplicast core box is produced with a mirror-like finish in the cavities without hand finishing or tooling of any kind. Here is the answer to the problem of keeping core boxes in repair.

HERE ARE THE ADVANTAGES OF DUPLICAST — *PROVEN IN PRODUCTION!*

- **Fins in castings are eliminated because of exact duplication of accurate core box cavities.**
- **Core production schedules uninterrupted because extra core boxes are on hand at all times.**
- **No sampling or checking is necessary when a new core box is put in production.**
- **There is substantial reduction in scrap.**
- **There is substantial increase in core production over cast iron boxes formerly used.**

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INDUSTRIAL PATTERN WORKS

2625 W. Belmont Ave. • Chicago 18, Illinois

(*Continued from page* 156)

tests concerned a comparison of the effect of baking time and temperature and amount of core gas generated by core oil and resin type binders. The resin binders were both the urea and phenolic types. Since the resin type binders reach maximum tensile strength in a shorter period than does the oil type binder, an opportunity is provided to increase coreroom capacity by their use.

In addition to regular oil, tests were made with tall oil ester, a by-product of southern paper mill operation which is a pine tree derivative. This material, although currently used to only a limited extent, develops higher tensile strength per unit cost than do the other types of binders tested.

A description of coremaking operations at Stockham Valves & Fittings Inc. was given by Elliott M. Cranford and James G. Lovell of that company. Morris L. Hawkins, foundry superintendent at Stockham, was session chairman. This department, with a force of 59 men having 636 years total experience in coremaking, produces an average of more than 400,000 cores daily, with rejects averaging 5½ to 6 per cent. Samples of the major types of cores produced were on display, while motion pictures of the various operations employed were shown. A central coreroom produces all cores required by the individual brass, gray iron, malleable and aluminum foundries operated by the company.

(Top)—At the annual banquet, left to right: Tom H. Benners Jr., toastmaster; I. R. Wagner, AFS vice president; Warren Whitney, James B. Clow & Sons, speaker; Charles K. Donoho, Birmingham Chapter president, American Cast Iron Pipe Co. *(Center)*—Paul H. Stuff, Ross-Meehan Foundries Inc., technical speaker, and Charles B. Saunders, Tennessee Products & Chemical Corp., session chairman. *(Bottom)*—R. C. Harrel, Lone Star Steel Co.; Charles K. Donoho; Fred K. Brown, Birmingham Chapter vice chairman, Adams, Rowe & Norman Inc.; Tom H. Benners Jr., John F. Drenning, Birmingham Chapter secretary-treasurer, Kerchner, Marshall & Co. (Photos by J. P. McClendon, Stockham Valves & Fittings Inc., Birmingham)

Concluding speaker at this session was Ray H. Moore, Claude B. Schneible Co., Detroit, who discussed foundry modernization. W. E. Jones, Stockham Valves & Fittings Inc., was session chairman. Starting with a discussion of latest developments in equipment used in raw materials handling, Mr. Moore described equipment employed to handle sand, molten metal and castings in modern foundries, as well as facilities for removing dust and improving working conditions in plants. A number of the units discussed were incorporated in the articles by Mr. Moore presented in FOUNDRY from August through November, 1951 describing the modernized Studebaker Corp. plant.

Describe Cupola Operation

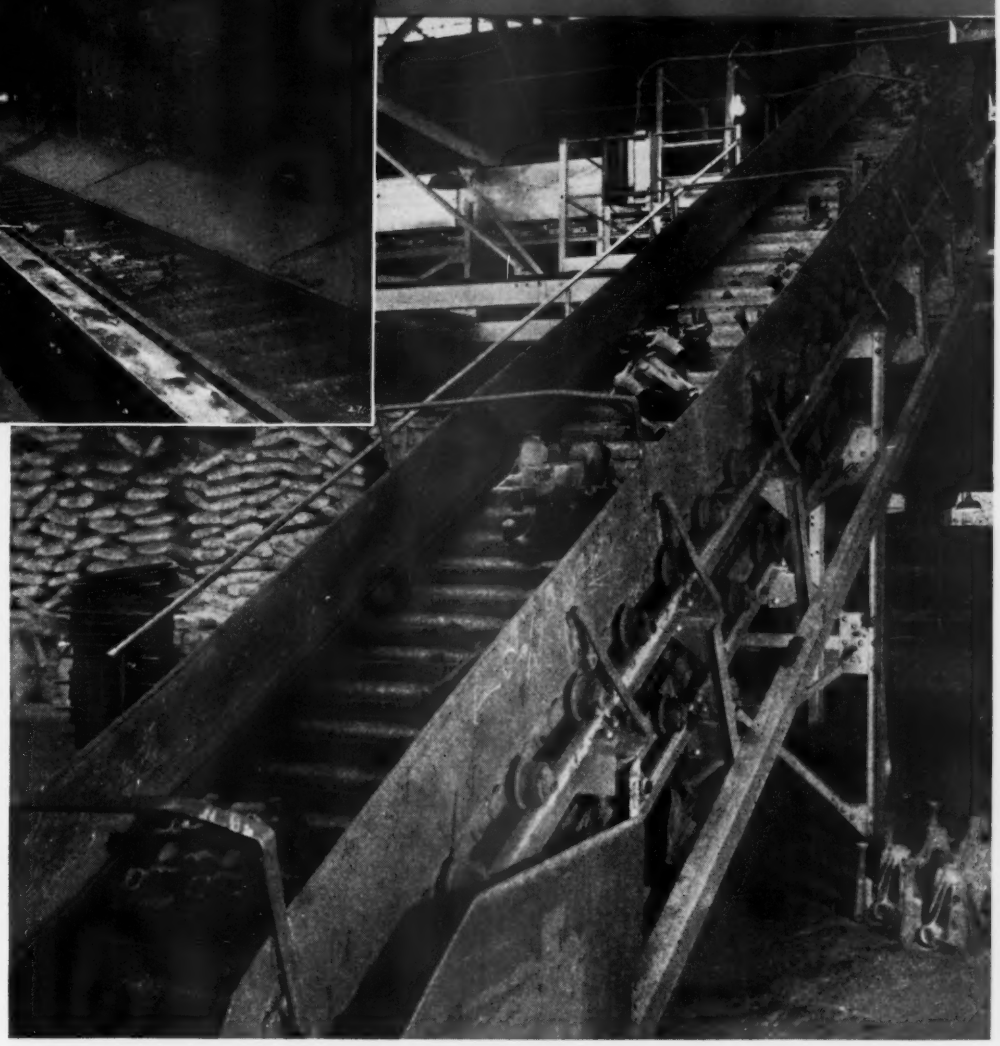
Various recommendations for avoiding trouble in cupola operation were offered by Walter R. Jaeschke, Whiting Corp., Harvey, Ill., at the third technical session. Harry G. Mouat, Harry G. Mouat Co., Birmingham, presided. To prevent hangups in the cupola, the speaker said, avoid use of large pieces of scrap and do not mix light and heavy sections indiscriminately. Try to mix the metal charge uniformly as to both type and size of scrap. For accurate results, employ a smaller scale to weigh the coke charge than that used in measuring metal. Coke can be damaged in handling, and the grab bucket should be avoided for this purpose, although no more than one handling by this type of unit generally does not harm strong coke. More excessive handling by a grab bucket will create fines which can cause trouble in the cupola.

Mr. Jaeschke described the advantages of the hot-blast cupola, and recommended use of a holding furnace to smooth out variations in chemistry of the metal. He also referred to air-weight control as the most useful tool for the cupola.

Effect of deoxidation in the cupola on the machinability of gray iron was discussed by Frank S. Kleeman, consultant, Pittsburgh. Fred C. Bar-

(*Concluded on page* 160)

CASTINGS TAKE A RIDE...on the level and even *UPHILL*



Steel Apron Conveyors—leak-proof and bench high — are doing a real job in this modern foundry. They keep castings on the move in a way that spells increased production—lower costs. Accurately-formed double-beaded flights with ends arc-welded tight. Cleats are welded onto conveyor (at right) to prevent back flow when carrying up steep inclines.

- Clamshell Valves
- Bucket Elevators
- Belt Conveyors
- Core Crushers
- Disintegrators
- Electric Vibrating Feeders
- Pivoted Bucket Conveyors
- Flask Fillers
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- Rotary Breaker Screens
- Sand Mixers
- Sand Aerators — Blenders
- Scraper Conveyors
- Transmission Mach'ry

IMPORTANT Breakdowns in production lines are costly. Jeffrey Foundry Engineers are thoroughly familiar with the severe conditions encountered in the modern foundry. Service includes survey, followed by study and preparation of equipment layouts to suit varied requirements. They are specialists . . build for you, whether your foundry is large or small. Write us today.

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Complete Line of Material Handling, Processing and Mining Equipment

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Galion (Great Britain Ltd.), Wakefield, England
The Ohio Malleable Iron Co., Columbus, Ohio

(*Concluded from page* 158)

bour, McWane Cast Iron Pipe Co., Birmingham, was chairman of this portion of the session. Mr. Kleeman pointed out that machinability of gray iron varies with its microstructure and is not measured by brinell hardness of the material alone. Deoxidizing iron in the cupola promotes a dispersion of those constituents which are hard to machine. The speaker discussed the use of silicon carbide as a means of effecting deoxidation. A detailed discussion of this subject was contained in an article by Mr. Kleeman, presented in FOUNDRY, January, 1951, page 100.

Concluding technical speaker was Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., who discussed quality control. Session chairman was Frank Copeland, American Cast Iron Pipe Co., Birmingham. Quality control, Mr. Kuniansky emphasized, is a function of top management and requires proper supervision. With slides, the speaker illustrated a number of the processes employed at the Lynchburg foundry directed toward maintenance of better quality in product. One project started recently is the maintaining of records covering different typical kinds of casting defects and their correction. After a period of time, it is believed that this collection will assist supervisors in quickly recognizing the probable cause of similar defects as they occur. A pilot foundry established at Lynchburg has been an important factor in smoothing out the start of production of new castings, since each one is studied in the pilot foundry for rigging, gating, etc., before commercial production starts.

Friday morning was devoted to plant visitation. Through the co-operation of a committee headed by Ross Martin Jr., McWane Cast Iron Pipe Co., 27 plants in the Birmingham district were open to visitors.

Thursday evening conference visitors were guests at an entertainment program arranged by a committee headed by Elliott M. Cranford and Joe T. Gilbert, Stockham Valves & Fittings Inc.

The conference was concluded by the annual banquet presided over by Charles K. Donoho, Birmingham District Chapter chairman and chief metallurgist, American Cast Iron Pipe Co. Tom H. Benners Jr., T. H. Benners & Co., Birmingham, was toastmaster and introduced the principal speaker, Warren Whitney, vice president, James B. Clow & Sons. Mr. Whitney, who also is general manager of the National Cast Iron Pipe Division, Tarrant, Ala., titled his talk, "Shall We Scrap It?"

To Train in Statistical Quality Control

College of Engineering, University of Colorado, Boulder, Colo., will conduct its third annual training course in statistical quality control June 17-27 under Prof. John F. Wagner.

Course will include quality control charts, acceptance sampling, and other industrial statistical methods and will be taught by men of national reputation in these fields. Additional information and applications for admission may be obtained from Professor Wagner.

Corrosion Testing

The Edgar Marburg Lecture on Corrosion Testing, presented by Francis L. LaQue, International Nickel Co., New York, at the 1951 annual meeting of the American Society of Testing Materials, has been published in booklet form. Containing 96 pages the booklet discusses atmospheric corrosion studies, relations between rust color and corrosion, effects of alloying elements, atmosphere comparisons, galvanic corrosion as well as a variety of corrosion tests. The booklet, priced at $1.50, may be obtained from the society, 1916 Race St., Philadelphia 3.

Meetings of Interest to Foundrymen

Apr. 10-11—Malleable Founders' Society, market development conference, Case Institute of Technology, Cleveland

Apr. 11-12—Health Protection in Foundry Practice, School of Public Health, University of Michigan, Ann Arbor, Mich. H. E. Miller, director of continued education

Apr. 25—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Apr. 27-May 1—American Ceramic Society, annual meeting, William Penn Hotel, Pittsburgh

May 1-7—American Foundrymen's Society, International Foundry Congress & Show, Atlantic City, N. J.

May 1-7—Non-Ferrous Founders' Society, annual meeting, Atlantic City, N. J.

May 6-9—International Lighting Exposition and Conference, Public Auditorium, Cleveland

May 14-16—Society for Experimental Stress Analysis, spring meeting, Lincoln Hotel, Indianapolis

May 16—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

May 22-24—American Society for Quality Control, annual convention and exhibition, Onondaga County War Memorial Auditorium, Syracuse, N. Y.

May 23—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

June 16-17—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

June 23-27—American Society for Testing Materials, annual meeting, Statler Hotel, and Hotel New Yorker, New York

July 25—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Sept. 8-10—American Standards Association, national standardization conference, Museum of Science & Industry, Chicago

Sept. 8-12—Instrument Society of America, annual meeting, Cleveland

Sept. 22-23—Steel Founders' Society, fall meeting, the Homestead, Hot Springs, Va.

Sept. 26-27—Ohio Regional Foundry Conference, Ohio Chapters, AFS, and Ohio State Student Chapter, Ohio State University, Columbus, O.

Oct. 16-17—Gray Iron Founders' Society, annual meeting, Hotel Cleveland, Cleveland

Oct. 16-18—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18—Michigan Regional Conference, Central Michigan, Detroit, Saginaw Valley, and Western Michigan Chapters, AFS, University of Michigan, Ann Arbor, Mich.

Oct. 20-24—American Society for Metals, National Metal Congress and Exposition, Philadelphia

Oct. 25-26—Northwest Regional Foundry Conference, Oregon, Washington, and British Columbia Chapters, AFS, Multnomah Hotel, Portland, Oreg.

Nov. 10-12 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Nov. 13-14—Southwestern Regional Foundry Conference, Texas and Tri State Chapters, AFS, Baker Hotel, Dallas, Tex.

Nov. 19—American Standards Association, annual meeting, Waldorf-Astoria Hotel, New York

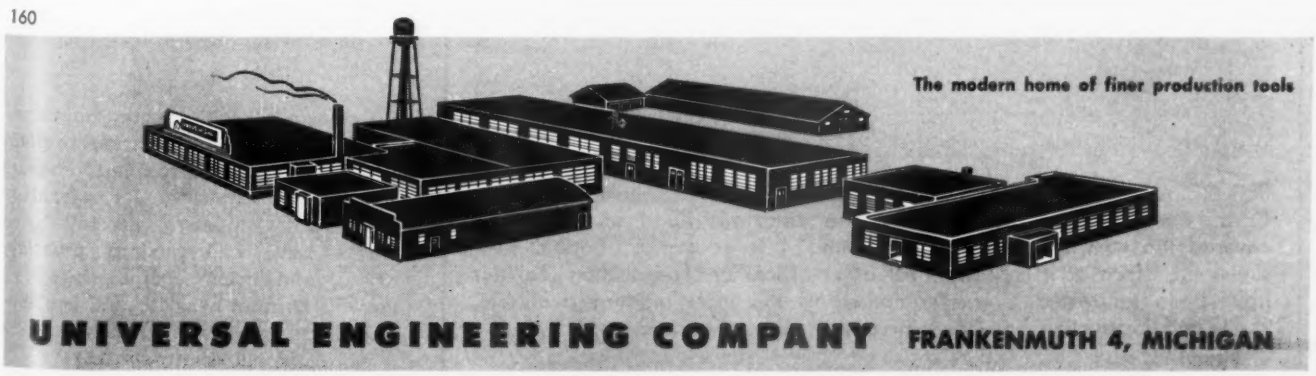
Dec. 4-6—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference William Penn Hotel, Pitttsburgh

YOU SAVE TIME WITH UNIVERSAL

THREADED FLASK PINS AND BUSHINGS

Universal Flask Pins and Bushings save precious minutes of production time because they assure instant, accurate alignment of cope and drag. And they also save down-time because, being heat-treated and precision ground from fine quality steels, they stand up under rough treatment and give long, satisfactory service. Universal threaded series Flask Pins and Bushings are used in steel, aluminum, magnesium or other light metal flasks. Bushings are available in both the round and elongated types; pins in both round and hexagonal types. Universal carries a complete line of sizes of its threaded series as well as its taper and plain series Pins and Bushings as regular stock items. For further information write to the Universal Warehouse nearest you — 1060 Broad St., Newark, N. J., 5035 Sixth Ave., Kenosha, Wisc., or the home office.

160



Industry BRIEFS

AMERICAN Foundries Co., Milan, Mich., division of Maumee Malleable Castings Co., Toledo, O., has improved and expanded its facilities the past year to accommodate production of plain and alloy gray iron castings up to 25,000 pounds. The company's name formerly was American Boiler & Foundry Co., but the latter part of 1950 production of warm air furnaces and boilers was discontinued. Operations since then have been concentrated on semiproduction, job and specialty gray iron castings, hence the change in operating name.

Production Pattern & Foundry Co., Chicopee, Mass., has added several major pieces of equipment, including a 20,000-lb capacity annealing furnace. The company operates a mechanized squeezer and light rollover shop, specializing in gray iron castings requiring intricate workmanship. Ray Olson is once again handling sales for the company.

* * *

Schaible Co., Cincinnati, plumbing and heating equipment manufacturers, recently acquired a plant in suburban Mariemont, formerly owned by Emery Industries Inc., for approximately $1 million. Building covers 140,000 sq ft of floor space, is over 600 ft long and land covers 6 acres. New plant, to be completed before the end of 1952, will house manufacturing and executive offices of the company. Meanwhile the company will continue to operate its present plant headed by Michael F. Schaible.

* * *

Claude B. Schneible Co., P. O. Box 502, Roosevelt Annex, Detroit 32, maker of dust control systems for the foundry, metalworking and process industries, has opened executive offices at 212 Stephenson Bldg., Detroit. Executive staff, sales, advertising and accounting departments will operate from the new offices. Factory offices (engineering, production and purchasing) will continue at 2827 25th St., Detroit.

* * *

Castalloy Co., Brookline, Mass., has begun foundry operations at its plant recently completed on West Central St., Natick, Mass., where it will specialize in magnesium castings for U. S. Air Force use. Located 18 miles west of Boston, the foundry includes the most modern equipment for producing magnesium castings under a quality control system, utilizing physical testing and a chemical laboratory.

* * *

Keyes-Davis Co., Battle Creek, Mich., has acquired Burr Oak Brass & Aluminum Co., Burr Oak, Mich. Company will continue to manufacture aluminum patterns, and expansion is planned. Ralph Donkin, who organized the patternmaking company 15 years ago, will continue for a short time in an executive position. James Barker, formerly of Rochester, N. Y., is manager of the foundry.

* * *

Architectural Metals Inc., Lindenhurst, N. Y., has been incorporated as a foundry and machine shop with capital stock listed at 200 shares, no par value. Directors are: Oscar Murov, 25 West Hoffman Ave., Lindenhurst; Sybil R. Beer, RD #3, North Babylon, New York, and Eliza A. Kotowski, 236 Twelfth St., West Babylon, N. Y.

* * *

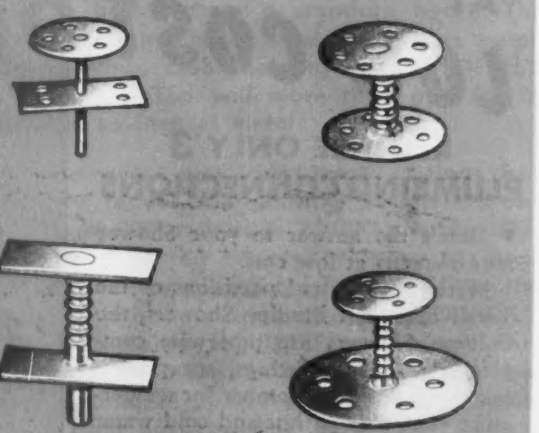
Robinson Clay Products Co., Akron, O., has undertaken an extensive plant expansion and improvement program to increase output of its refractory products. Companys' fireclay brick plants have had modern pressing, drying and firing equipment added, as well as new periodic and continuous kilns. Pressing and forming

(*Concluded on page* 164)

BEFORE AND AFTER: Top view shows an office at Sonken-Galamba Corp., Kansas City, Kans., just after the disastrous flood of July which covered the company's entire plant with 14 ft of water. Bottom view shows the office as it is today. All other offices and production facilities have been renovated. New equipment is the most modern available, and production has been increased above preflood capacity

FANNER MOTOR CHAPLETS

THE BEST CHAPLET FOR CASTINGS UP TO 1" METAL THICKNESS

Type of Application	Type of Chaplet Used
STOVE BURNERS	
RADIATOR SECTIONS	
GASOLINE OR DIESEL ENGINES	
PUMP CASTINGS	
CYLINDER HEADS	

Fanner Motor Chaplets are available either tin or copper coated. Order today.

FANNER MFG. CO., CLEVELAND 9, OHIO

In Canada: CANADIAN FANNER, LTD., Hamilton, Ont., Canada

(*Concluded from page* 162)

equipment has been installed at the silica brick plant and shipping facilities have been improved.

* * *

Bagley & Sewell Co., Watertown, N. Y., suffered damage to its foundry and coreroom, Mar. 1, from fire caused by ignition of leaking oil.

* * *

Scrolls of appreciation, signed by representatives of eight foreign countries, have been presented to H. Kramer & Co., Chicago, and its Ajax Metal Division, Philadelphia, in appreciation for the privileges extended to observe and inspect the company's operations. The tours were arranged by ECA in conjunction with the World Metallurgical Congress.

* * *

New armor steel foundry of Theis Pump & Steel Corp., Clarksburg, W. Va., now is in production.

* * *

United States Gypsum Co. is marking its 50th anniversary this year. The company in February, 1902 started the sale of gypsum rock, land plaster, plaster of Paris and wall plaster. Products have been widely diversified since that time, and the company's total investment in plants and properties now is $134 million.

* * *

Reed Roller Bit Co., Cleco Division, Houston, Tex., maker of air tools and accessories, has appointed the following distributors: Arrow Supply Co., 3616 Liberty Ave., Pittsburgh 1; Peerless Supply Co., 1118 Grand Ave., Des Moines 9, Iowa, and Bates Supply Co., 11 Vernon St., Quincy 69, Mass.

* * *

Michigan Material Handling Corp., 13721 Joy Rd., Detroit, has been appointed state distributor for sales and service of mobile gas and diesel cranes manufactured by Coles Crane Inc., Joliet, Ill. C. L. Jackson is manager of the Detroit office of the material handling company.

* * *

Lintern Corp., formerly located in Berea, O., has moved to its new plant in Painesville, O. Total area of the property covers 46,000 sq ft and contains both plant and offices. Company makes filtering, cooling, ventilating and safety equipment for crane cabs.

* * *

Stratford Metal Industries Inc., Kings, N. Y., has been incorporated as a foundry and machine shop, capital stock listed at 300 shares, no par value. Directors include: Lester Fine, Oscar Purcaro and Charles Petropoulos, 50 Broad St., New York.

* * *

Battle Creek Foundry Co., Battle Creek, Mich., is completing rebuilding of its plant razed by a fire last Dec. 23. A larger cupola and a mechanical charger have been installed, doubling the foundry's melting capacity.

* * *

Kersman Equipment Co., Muskegon, Mich., has been licensed by American Metaseal of New York to sell a new sealing process for castings to foundries in western Michigan.

Proceedings on Clinic Are Available

Copies of the proceedings for the National Time and Motion Study and Management Clinic, sponsored last fall by the Industrial Management Society, are available for $4 from the society, 35 East Wacker Drive, Chicago 1. In addition to the clinic, several concurrent sessions on management engineering were held.

COLUMN SHOWERS
(FOR GROUP USE)
AT
LOW COST

REQUIRE ONLY 3 PLUMBING CONNECTIONS

• Here's the answer to your Shower requirements at low cost.

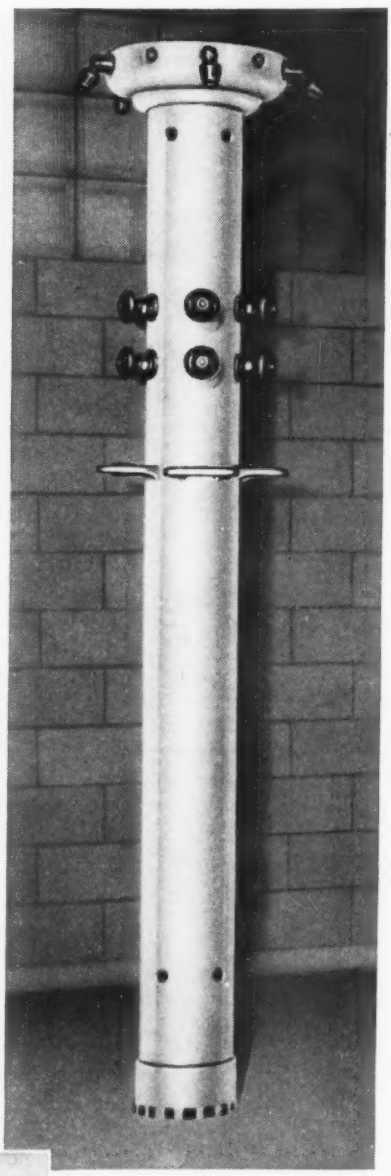
Without the usual partitions of the 3-stall or 5-stall Bradley Showers, the Column Showers are otherwise complete with drain fittings, sprayheads, soap trays, mixing chamber for temperature control with hot and cold water control valves. Ready to install.

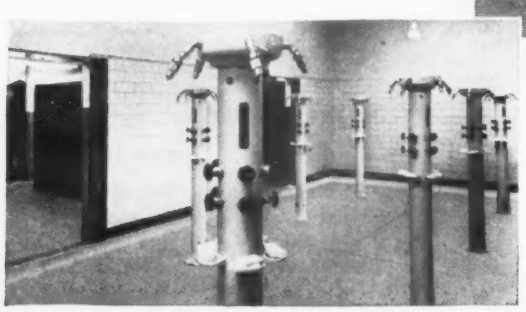
Floor space is saved and by placing Showers away from walls, wall waterproofing is not required and space may be used for lockers and benches.

Ideal for Factories, Mines, Camps, Schools, Field Houses, Institutions.

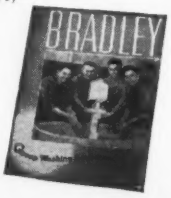
BRADLEY WASHFOUNTAIN CO.
2217 W. Michigan St., Milwaukee 1, Wisconsin

BRADLEY showers
Distributed through Plumbing Wholesalers



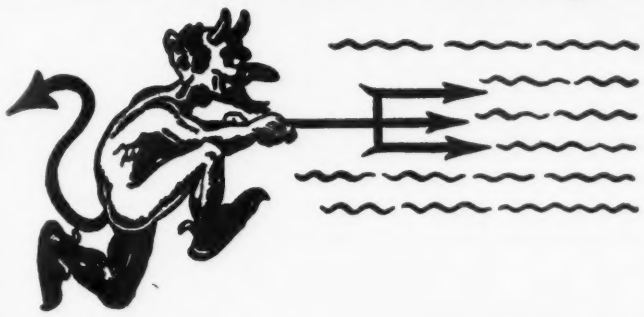


Left: Installation of 8 Bradley Column Showers,— Cincinnati Chemical Co.



Write for Catalog 4701-CS

New Head Compound Saves Metal!



Soffel's New

Thermotomic "HOTOP" Carbon Free Liquidizer

AN EXOTHERMIC CARBON FREE LIQUIDIZER FOR IRON, STEEL, AND NODULAR IRON

SOFFEL'S THERMOTOMIC HoTop CARBON FREE LIQUIDIZER is an entirely new head compound, developed for use to reduce the height of feeding risers to one-third or one-half of their diameters. For an example, 6″ x 6″ feeding risers can be reduced 2″ to 3″ in height.

SOFFEL'S THERMOTOMIC HoTop CARBON FREE LIQUIDIZER is different from other head compounds in that SOFFEL'S THERMOTOMIC HoTop does *NOT* contain powdered metal, is *NOT* a thermit base compound. It is a patented exothermic compound entirely free of carbon, sulfur and phosphorous and can be used without danger of contamination on any ferrous metal or alloy.

SOFFEL'S THERMOTOMIC HoTop will permit reduction of feeding riser heights 60 to 70%. THERMOTOMIC HoTop LIQUIDIZER will produce temperatures well above 4000° F. This high heat increases the temperature of the feeding metal well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. Shrink cavities under the feeding heads and porosity in the castings caused by premature freezing of the feeding metal are entirely eliminated.

Many advantages are to be gained by the use of SOFFEL'S THERMOTOMIC HoTop; chills in molds to induce directional solidification can in great measure be eliminated. A large amount of pouring metal is saved because of the smaller amount of metal required for feeding risers. Many more castings can be poured from a standard heat. The great reduction in heights of heads also saves metal, cost of remelting, also molding time. SOFFEL'S THERMOTOMIC HoTop will more than pay for its cost of use in savings of metal.

One major user, producing large castings has been able to reduce the pouring weight on one casting from 96,000 pounds to 76,000 pounds. This same user has poured twenty or more of these castings without any piping or shrinkage from the feeding heads into the casting since using SOFFEL'S THERMOTOMIC HoTop LIQUIDIZER. This not only represents a great savings in money and metal but permits an additional 20,000 pounds of metal that was saved from each casting, to be poured into other castings. SOFFEL'S THERMOTOMIC HoTop LIQUIDIZER produces equal savings on smaller castings also.

OTHER USES FOR IRON, STEEL, AND NODULAR IRON

SOFFEL'S THERMOTOMIC HoTop CARBON FREE LIQUIDIZER can be used in the ladle to increase the temperature of cold heats. It is also used to prevent or eliminate skulls in ladles. The great amount of heat and fluidity which it develops makes it ideal for the above applications.

SOFFEL'S THERMOTOMIC HoTop CARBON FREE LIQUIDIZER is also being used with a great deal of success as a hot topping in ingot production. Its great heat generating and insulating value combined with the fact that it contains no powdered metals which could contaminate the metal, makes it particularly suitable for eliminating hot tops in the production of ingot steel.

Complete instructions for reducing various heights of risers, are furnished with SOFFEL'S THERMOTOMIC HoTop LIQUIDIZER. See your supplier or write us for trial sample.

Beware of Imitations: **We are the originators of Exothermic Carbon Free Liquidizers and Patented Thermotomic Compounds**

PITTSBURGH METALS PURIFYING COMPANY

Manufacturers of Fluxes and Purifiers for All Metals and Alloys

1352 MARVISTA ST., N. S. PITTSBURGH 12, PA.

OBITUARY

GUIDO VANZETTI, president of the International Committee of Foundry Technical Associations, died Mar. 5. Mr. Vanzetti, who was also president of the Italian foundry technical organization, was graduated

GUIDO VANZETTI

from the Polytechnic School of Milano in 1928. At that time he became associated with his father's firm, Fonderia Milanese di Acciaio Vanzetti. Upon his father's death in 1932 he was appointed director of the company and later managing director. Mr. Vanzetti represented Italy at various foundry congresses and presented papers before the British and French foundrymen's societies. He was to have presided at various events of the International Foundry Congress in Atlantic City next month.

* * *

Morris E. Leeds, 82, founder and chairman of the board, Leeds & Northrup Co., Philadelphia, died Feb. 8 at Lake Wales, Fla. Mr. Leeds, educated at Haverford College and University of Berlin, gave up teaching to manufacture scientific instruments of precision. He founded Leeds & Northrup Co. in 1899 and was long a student of human relations in industry. His company became a cooperative association in 1918.

* * *

Harry C. McLain, 56, associated with the operation of McLain's System Inc., Milwaukee, died Feb. 20. A veteran of World War I, Mr. McLain about a year ago became associated with the correspondence school in foundry methods, founded in 1908 by his father, the late David McLain.

* * *

F. C. Biggert Jr., 73, chairman of the board, United Engineering & Foundry Co., Pittsburgh, and a pioneer in design of continuous strip mills for the steel industry, died Feb. 10. Following graduation in 1899 from Western University of Pennsylvania, Mr. Biggert joined Frank-Kneeland Machine Co., which 2 years later helped form United Engineering & Foundry Co. He was made chief engineer of the new company in 1913 and became president-general manager in 1919. He had been chairman since 1943.

* * *

A. G. Peterson, 64, general sales manager, Eastern Division, Corn Products Refining Co., New York, died Feb. 11. Mr. Peterson joined the company in 1907 as a specialty salesman in Indiana, became manager of the Philadelphia office in 1918, division manager in 1935, and 4 years later was made a vice president of Corn Products Sales Co.

* * *

Frank H. Dodge, 68, Michigan sales representative for the Foundry Products Division, Archer-Daniels-Midland Co., Cleveland, died Feb. 11, at Ford Hospital, Detroit. Mr. Dodge joined Werner G. Smith Co. in 1913 as Michigan sales representative, remaining in that capacity when it was acquired by Archer-Daniels-Midland Co. in 1929. As a young man he was associated with Ferro Machine & Foundry Co., Cleveland.

FRANK H. DODGE

* * *

Edward O. Schneider, 60, who has served as sales manager of Ottawa Silica Co., Ottawa, Ill., for the past thirty years, died recently at his home in Ottawa. Prior to 1922 Mr. Schneider had been sales representative for the McDougall-Butler Co., Buffalo, N. Y.

* * *

Marion E. Gladfelter, 85, foundry consultant, Bucyrus-Erie Co., Milwaukee, died Feb. 22. Mr. Gladfelter went to South Milwaukee from Baltimore, in 1893, as foreman of the pattern shop at Bucyrus-Erie.

Walter Bryan, 62, for 15 years assistant manager, Deck Bros. Inc., Buffalo, died Jan. 28. Mr. Bryan left school to work as office boy in the former Lackawanna Steel Co., Buffalo, and later was secretary to the vice president until it was acquired by Bethlehem Steel Co. For 17 years prior to joining Deck Bros., he was superintendent of Fillmore Foundry Inc., Buffalo.

* * *

Charles W. Wright, 60, since 1929 president, Badger Meter Mfg. Co., Milwaukee, died Feb. 14. Mr. Wright attended Washington and Lee University and joined Badger Meter in 1924, following 6 years of sales work. He has headed the company since 1929.

* * *

Joseph P. Keegan, 69, president, J. P. Keegan & Son, Newark, N. J., died Jan. 31. In 1919 Mr. Keegan founded the Kastwell Foundry Co., forerunner of the casting company which now bears his name.

* * *

Walter J. Mullally, 62, sales engineer, American Manganese Steel Division of American Brake Shoe Co., Chicago, died Feb. 17. Mr. Mullally had been with the company over 25 years.

* * *

Linus Krebs, 65, secretary-treasurer of the Federal Malleable Co., Milwaukee, died Mar. 6. He had been a director of the company for many years.

* * *

J. H. Young, 67, president-general manager, Centre Foundry & Machine Co., Wheeling, W. Va., died Feb. 23.

* * *

Clarence A. Pattison, 83, president, Peoria Malleable Castings Co., Peoria, Ill., died Feb. 18.

* * *

Charles B. Carter, president, Alloys Foundry Co., Chicago, died there Mar. 10.

Bohn Aluminum Is Cited

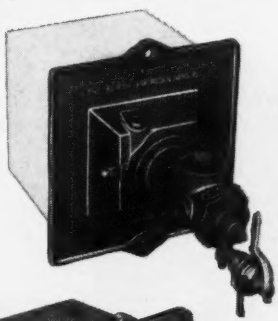
American Legion's Michigan Department has awarded the Citation of Meritorious Public Service to Bohn Aluminum & Brass Corp. and its president, Simon D. DenUyl. Presentation of the citation, given for outstanding service and contributions to Americanism, was made by Commander Thomas Roumell to Mr. DenUyl at a ceremony in Veterans Memorial Building, Detroit. It lauds Bohn for appropriating "the bulk of its advertising appropriations into the fight against the menace of Communism."

Here to stay.. DUAL-FUEL* BURNERS

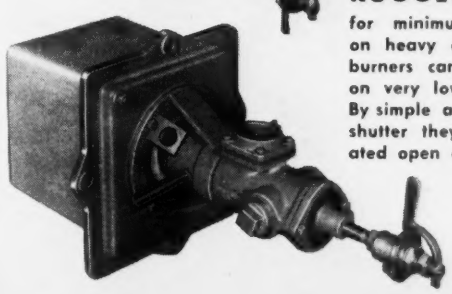
PIONEERED IN 1917 BY

North American

LUMINOUS OR LONG FLAMES
with either gas or oil are produced by the Series 113 Burners. They are desirable for vast coverage, for fewer burners and for uniformity of flame temperature.



SHORT FLAMES
are produced by the Series 221 Burners. These burners provide a highly stable and efficient fire, using either gas or oil. They are recommended wherever heating in a relatively small space is required.



RUGGED DESIGN
for minimum maintenance on heavy oil. Series 225 burners can also be used on very low gas pressure. By simple adjustment of the shutter they can be operated open or sealed-in.

COMPLETE SYSTEMS for GAS and OIL

Maximum Efficiency with Either Fuel

•

Switch Fuels Instantly

•

Automatic Fuel-Air Proportioning

•

Wide Turndown Range

•

Seven Burner Styles to fit any Type of Application

★ Dual-Fuel: The North American name for burners designed especially for both gas and oil. Fuel changed by merely turning valves.

THE NORTH AMERICAN MANUFACTURING COMPANY
MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL
BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES
CLEVELAND 5, OHIO

HOW TO ADAPT CASTINGS TO

Unitized Load Handling

UNITIZED loads for easy handling of manufactured products are best adapted to parts of regular shape. But unless your pieces are really special, a little thought applied to unitizing problems can produce substantial savings through more efficient handling.

Shipping is a major operation at a production foundry, and here's how Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., speeds the movement of some of the castings it produces. These include such items as cylinder liners, diesel cylinder blocks, camshafts and tank treads—castings of such irregular shapes that standardized palletizing wouldn't work in most cases. However, inexpensive home-made arrangements have provided pallet type unit loads which are easily handled by the company's fork trucks.

Take the case of tank-tread castings——their irregular shape does not appear to lend itself to unitizing. A few strips of wood, and some steel strapping coupled with some care in nesting the "dog-ears" of the castings makes up the nest and stable load shown in the illustration.

Camshafts were a less serious problem, but the same wood strips and steel strapping helped make a better load. While they could be piled into unit loads for intraplant handling, they couldn't be stacked safely, and were apt to be jostled apart in transit to the customer. The accompanying view shows the result of the strapping—a load that won't collapse if shaken or jostled. Small cylinder blocks and heads are also strapped into unit loads for more complete utilization of truck capacity. In addition, they make a solid "pack" in the boxcar.

The fork truck has become a ram truck in another illustration here. Large diesel cylinder blocks are handled by merely inserting one fork into a cylinder bore, thereby eliminating pallets or strapping.

In the fourth view a 6000-lb truck is loading a shipment of cylinder liners onto a highway truck. This is one of the relatively few standard pallet operations, but a variation here is in the sheet steel dividers between each layer of liners. With these dividers, several sizes of liners in separate layers can be assembled into one large load, as shown.

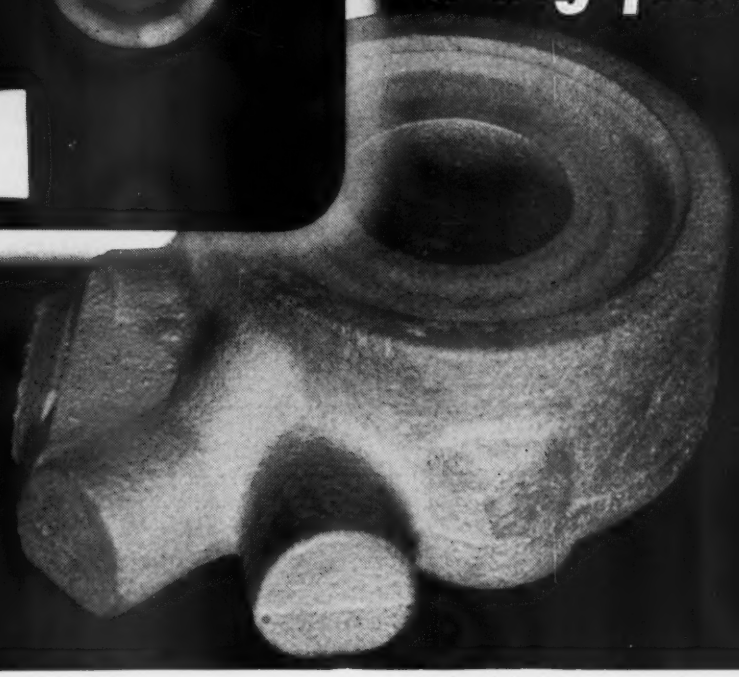
Tank treads specially nested are strapped into large unit loads for each fork truck handling

Strapped camshafts make a good solid load easily handled by fork truck in stacking and in shipping

Cylinder blocks are handled by inserting fork into bore. Other fork steadies block during travel

Cylinder liner loads have sheet dividers between layers. (Photos by Baker-Raulang Co., Cleveland)

RADIOGRAPHY MAKES SURE this jack base can shoulder a big job



Hydraulic jack bases—as cast.

Hydraulic jacks are born to lift loads many times their own weight and size—to stand internal pressures of thousands of pounds per square inch.

This takes sound castings—soundness which only radiography can prove without damage to the part. And the designers, knowing the casting will be sound, can count on strength without excessive weight.

Instances like this show why more and more foundries are making radiography routine. It is the way to be sure only high-quality castings are released.

If you would like to know how radiography can improve your plant operation, talk it over with your x-ray dealer. And, if you wish, we'll send you a free copy of "Radiography As A Foundry Tool."

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, New York

Radiography...

another important function of photography

Kodak
TRADE-MARK

Casting Steel in Dry Sand Molds

By SAMUEL R. ROBINSON

WHEN a production foundry receives an order for several thousand castings per day, castings that vary to some marked extent from the foundry's regular products, the manager and his chiefs of staff follow a regular routine in deciding on certain features, including design and construction of pattern and corebox.

Since dry sand cores in the majority of instances add to the cost, wherever possible the pattern is designed to leave its own core. Size, shape and position of gates, risers and pouring basin, special vents, depth of cope and drag, and shape of the flask merit consideration.

Although no statistics are available on the subject, it probably is safe to say that 25 to 30 per cent of all molds may be gated at any convenient point —top, bottom, side or end. Any opening through which metal may be poured will serve satisfactorily. These castings present no problem. But for the majority of castings, especially large castings, the size, shape and position of the gates and risers constitute a vital factor worthy of the most careful consideration.

In a production foundry all the foregoing factors enter into the anticipated solution of the problem. However, no one is unduly disappointed if the first casting is not perfect. Slight adjustments are made here and there in methods and equipment until the perfect casting emerges from the mold. Production of pilot or test castings is recognized as routine procedure in many foundries. The cost is negligible since it is absorbed by the thousands of subsequent perfect castings.

The general jobbing foundryman is not so fortunate. He receives orders for single castings or at most for an extremely limited number of duplicate castings. Unless he hits the happy combination on the first guess he makes no profit on the job. In addition to the features outlined, the foundryman has to decide whether to make the casting in a green sand, a dry sand or skin-dried mold.

A completely dried mold has many commendable features, but it is the most expensive of the three and involves the use of an oven. A skin-dried mold is an insurance against certain hazards and is not as expensive as a completely dried mold. Also, the skin-dried mold may be dried with a gas or oil torch, a jet flame, or with a small temporary wood or charcoal fire. While it is true that the great majority of small and medium size castings are made in properly prepared green sand molds, it is equally true that the hazards of erosion, cuts, scabs, swells and cold shuts increase in proportion to the size, area and weight of the castings.

The heat and corrosion resistant steel castings shown in the accompanying illustrations, were made in a midwest steel foundry according to a technique differing in some respects from orthodox practice. The man in charge of the job drew freely on a wide theoretical and practical experience. Although regarded as more or less of an experiment, the final result confirmed the accuracy of his judgment.

Cast Without Risers

Fig. 1 represents a cast steel I-beam furnace support 10 in. high, 11 in. wide and 72 in. in length, uniform metal thickness 1½ in. Casting weight, including gate and feeding heads, 650 lb. The casting was to be clean and solid and machined for a distance of 6 in. on the outside near each end. No riser was placed at any point on top of the casting. A ½-in. rod pushed through the cope above each side member at the opposite end from the gate formed openings for vents or whistlers.

Metal was poured into a single sprue, 2 in. diam, near one end. The sprue was connected to two feeders, 4½ in. diam, which in turn delivered metal to the mold through narrow, vertical gates. With this method of gating, the metal filled the lower part of the two side members first, then flowed gently over the central sand mound, and finally up into the upper part of the side members. Efficiency of the gating system was reflected in the clean, smooth surface on all parts of the casting, and this despite the fact that not a single nail was employed to reinforce the face of the mold.

After the pattern was removed from the drag, the faces of the mold, cope and drag were painted with a thin coat of silica wash, in this case a thin solution of silica flour and molasses water applied with a swab. The cope was suspended above the fire at a sufficient distance to prevent burning, but still close enough to absorb the necessary amount of heat. After a critical examination had showed that the casting was perfect, four additional castings were made

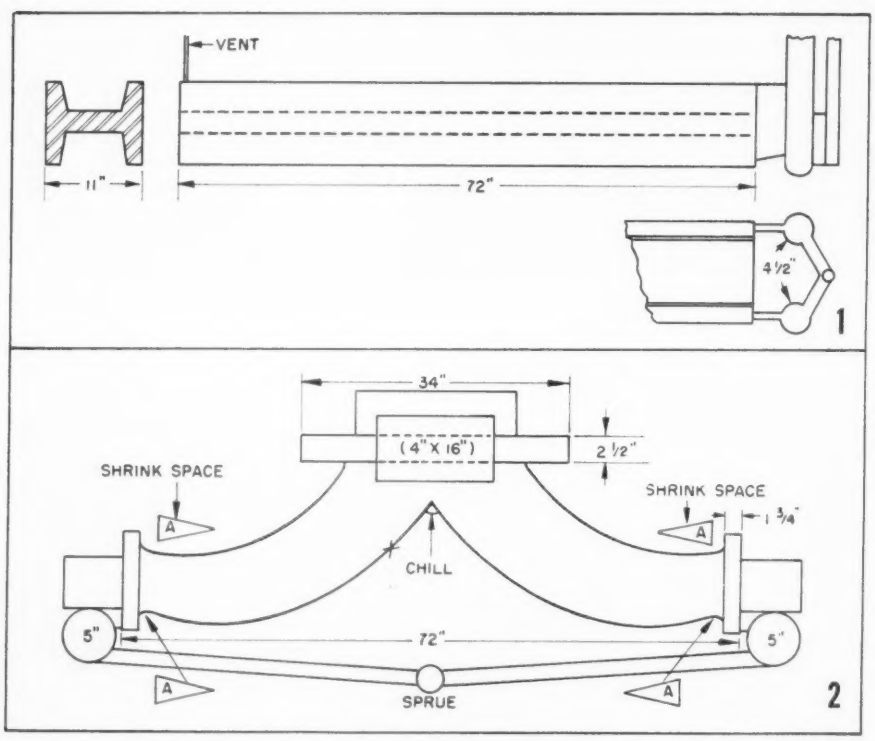


Fig. 1—Metal from the sprue first entered the risers and then flowed through narrow gates into the mold. Fig. 2—One out of five castings developed a small pin hole at point marked *X*, later repaired by welding

according to the same practice.

Fig. 2 shows the method adopted for gating and feeding a double branch pipe, extreme distance between branch flanges 72 in. The center flange was 2½ in. thick and 34 in. diam. Each of the branch flanges was 1¾ in. thick and 14 in. diam. Body metal in the casting was ⅞-in. thick. This casting from a split pattern was made in a mold completely dried in the oven. Since a dry sand mold offers greater resistance to casting contraction than either a green sand or a

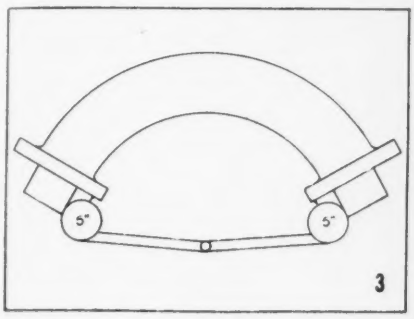


Fig. 3—Metal from a horizontal runner entered the mold through a riser at the side of each flange

skin dried mold, the blocks *A* were placed in the sand near the junction of pipe and flange at each end. The blocks were removed before the mold entered the oven. Steel shrinks or contracts approximately ¼-in. per ft. Therefore, it is apparent that in a distance of 6 ft the total contraction would be 1½ in. or ¾-in. for each end flange.

Metal poured into a central sprue traveled in a long horizontal runner right and left to 5-in. diam vertical feeders, outside and close to the flange face. The flange on the single or main branch, 2½ in. thick and 34 in. diam, was fed by a rectangular feeder 4 x 16 in. and 12 in. high. Five duplicate castings were made by this method. Analysis of the metal designed to resist corrosion showed: C 0.16 max, Cr 17-19, Ni 7.5-10.5.

A number of 9-in. elbows, as shown in Fig. 3, weighing 350 lb each, were gated as shown with a single sprue, a horizontal runner in the joint of the drag, leading to a 5-in. diam riser connected to the face of each flange. The molds were skin dried as in the first instance by a wood fire built on thin steel sheets laid on the drag. The cope for each mold was set up on edge a short distance above the drag and dried by the same fire. Surface of all castings was smooth and clean. The sand core was bonded with rosin.

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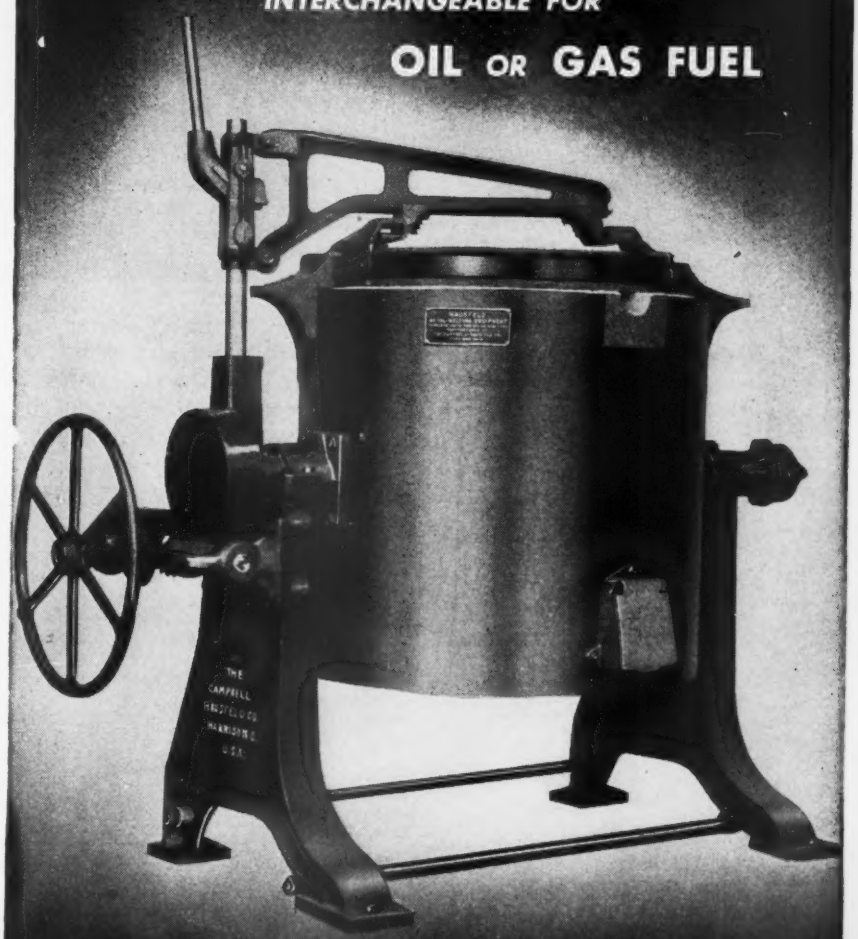

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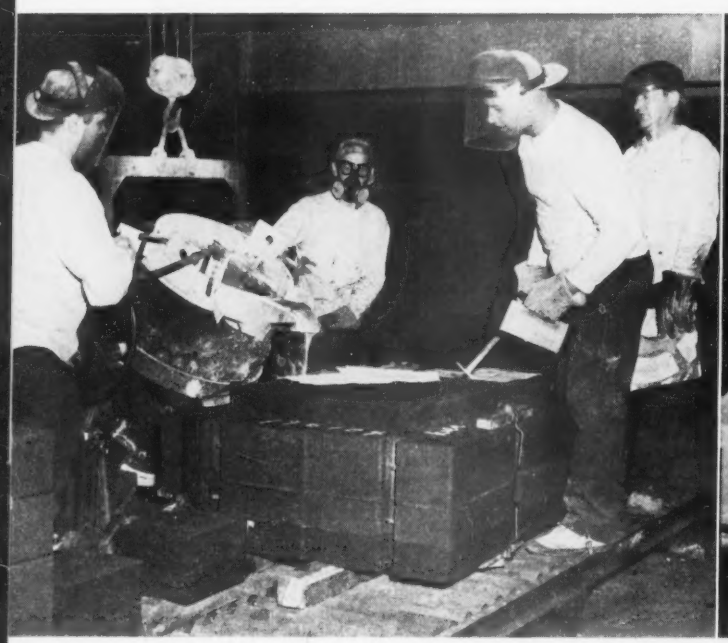
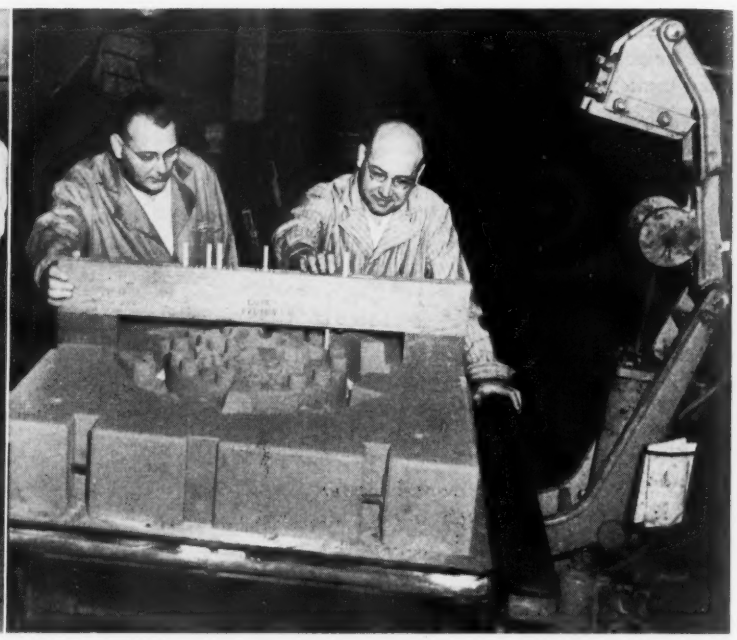
Magnesium Aircraft Castings

PRODUCED BY FORD DIVISION

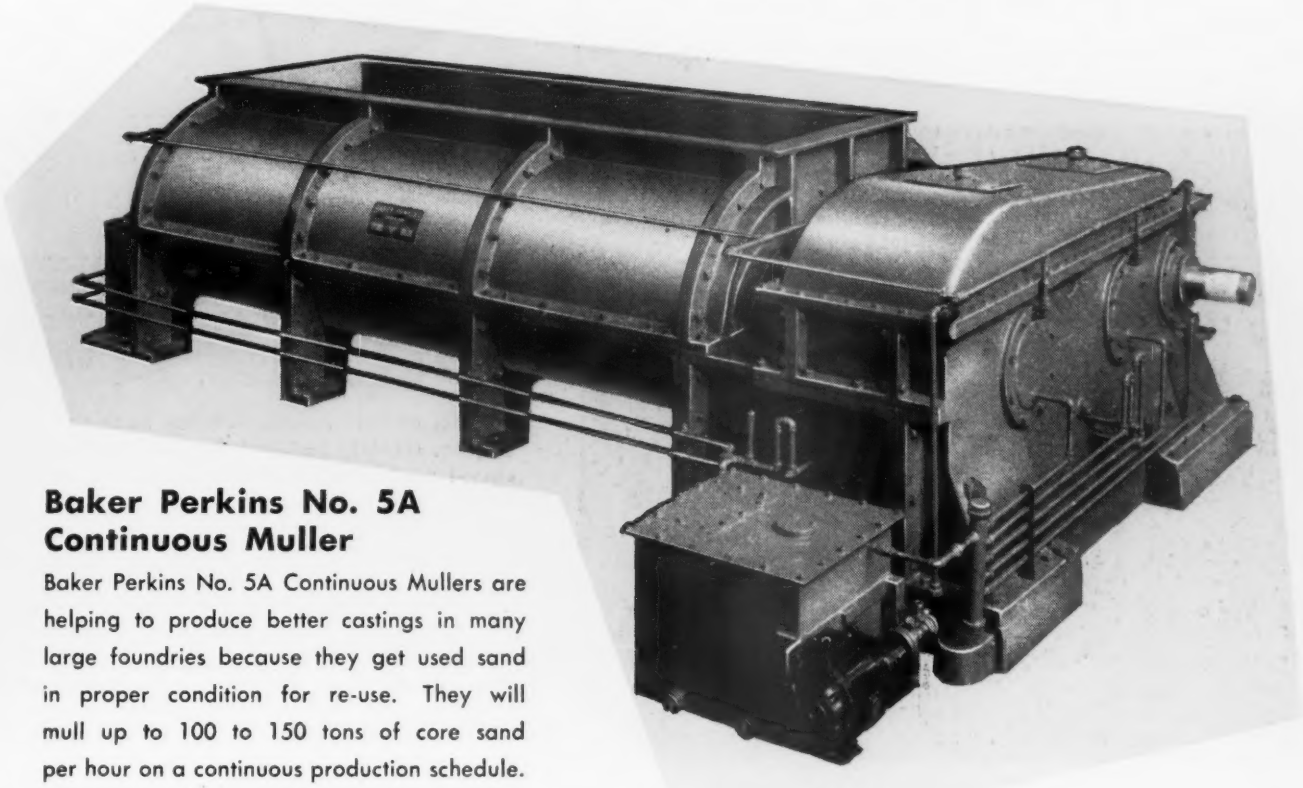




Fifteen different magnesium castings are required for the 28-cylinder Pratt & Whitney engine which Ford Motor Co. will build at its Aircraft Engine Division, Chicago. Metal from a 500-pound ladle is shown here being poured into one of the larger baked dry sand molds. Mold sections are held together by special clamps. At the right two workers are using a fixture to check final dimensions of a baked dry sand cope.

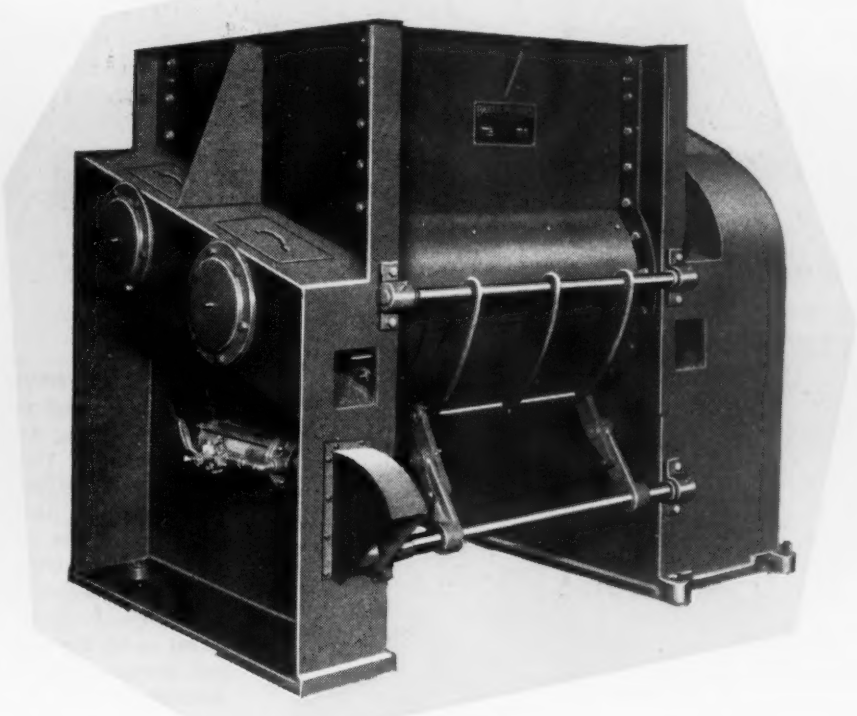
Checking the wall thickness of a magnesium casting for the 28-cylinder aircraft engine. To facilitate the checking, the casting is placed in a holding fixture. Mold-making in the Ford magnesium foundry of Ford Motor Co.'s Aircraft Engine Division is entirely a dry sand type of operation, with all molds baked. At the right workers are shown making one of the larger mold sections. Castings have been made on a limited scale for some time, but production will be expanding this year. A conversion to jet engine parts later is in prospect.

Two Baker Perkins sand handling units that help to improve casting quality



Baker Perkins No. 5A Continuous Muller

Baker Perkins No. 5A Continuous Mullers are helping to produce better castings in many large foundries because they get used sand in proper condition for re-use. They will mull up to 100 to 150 tons of core sand per hour on a continuous production schedule. Cast steel sigma type blades with renewable shoes mull in a figure 8 motion. Available in 30, 40-60 and 100-150 ton capacities.



Baker Perkins Unidor Core Sand Mixers

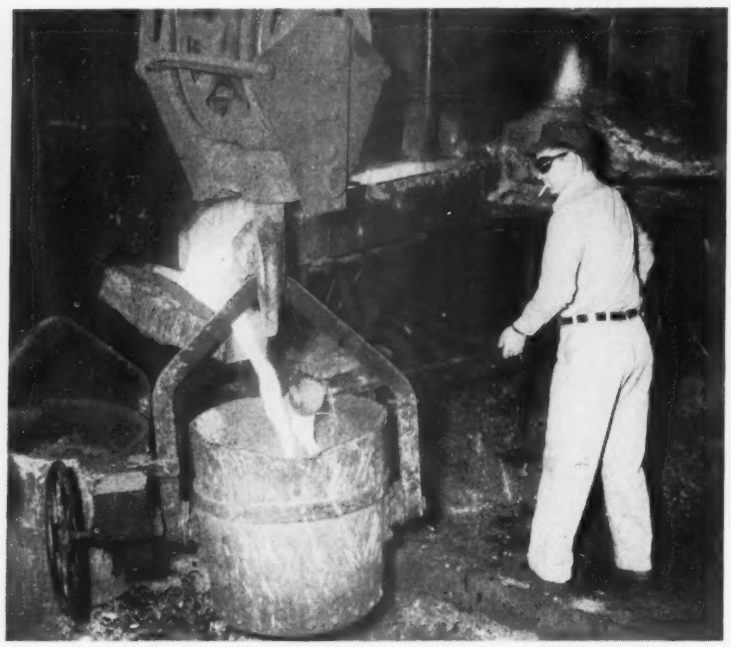
In smaller foundries these batch type mixers can help improve the core sand and thus give better casting quality. They rub, stir and knead all in one operation, distributing a thin layer of bond around each grain to assure 100% benefit from bonds, oils, binders and other compounds. Available in 5½ to 35 cu. ft. working capacities.

BAKER PERKINS INC.
FOUNDRY EQUIPMENT SALES
SAGINAW, MICHIGAN

224

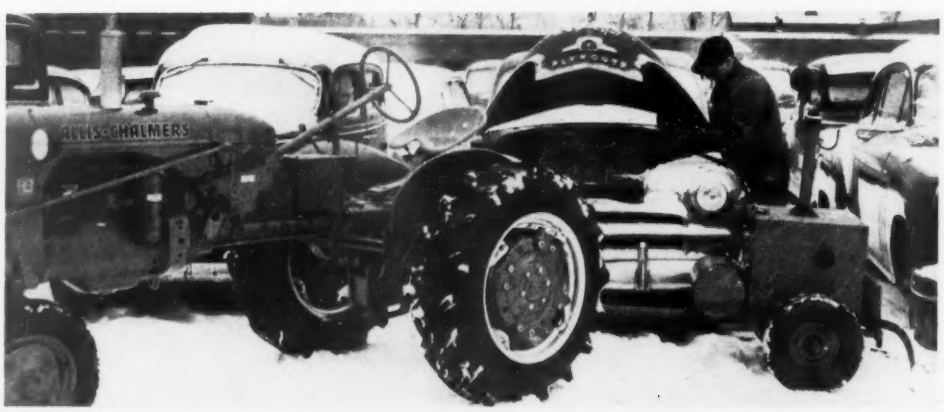
NEWS VIEWS

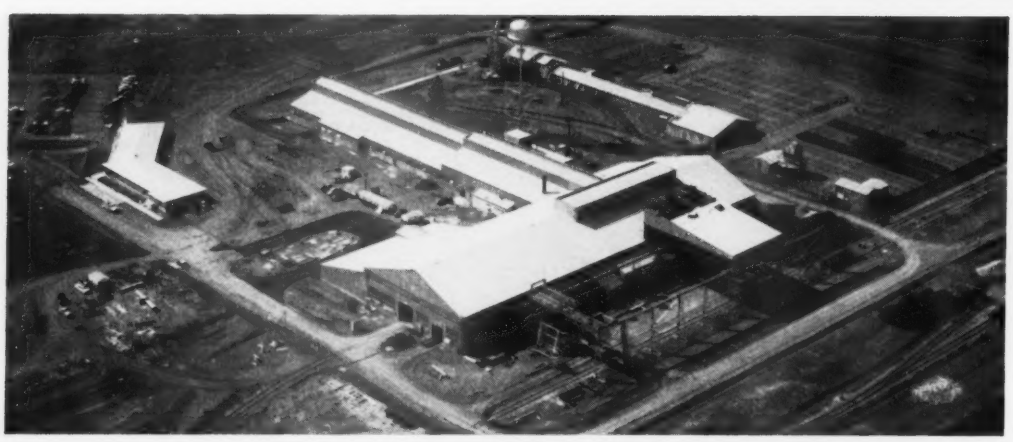
↑ **BIG BITE:** American Silica Sand Co., Ottawa, Ill., recently installed this new and improved shovel for loading trucks with foundry sand at its Reynolds Pit, one of its three sand pits in the Ottawa district. The shovel greatly facilitated the company's winter mining operations.



← **FIRST HEAT:** DeLaval Steam Turbine Co., Trenton, N. J., has completed installation of the Meehanite process controls in its foundry. Shown here is the first heat of Meehanite metal being tapped. The foundry produces about 25 tons of castings daily for such products as centrifugal and rotary pumps, steam turbines, centrifugal blowers and worm gear speed reducers.

→ **HELPING HAND:** Allis-Chalmers Mfg. Co. found an ingenious way this winter to speed the flow of employees' cars from its parking lots and adjacent streets in West Allis, Wis. Six portable booster battery units were provided during shift changes for engine-starting service. Formerly the company furnished tow service during cold weather. The new method proved much quicker and eliminated possibility of damage to cars during towing.





← **NEW FOUNDRY:** This aerial view shows the new California plant of United States Pipe & Foundry Co. at Decoto, Alameda county. The plant uses the centrifugal process in making cast iron pressure pipe in metal molds for water, gas, sewerage and industrial service.

Automatic Sand Preparation and Handling Increases Mold Output 35%

Sand Travels From Shakeout to Flask Without Shoveling—Using REDDY SANDY & HANDY SANDY

The Nelson Foundry Co., Morton Grove, Illinois, has increased their production 35% by using a combination of 3 Reddy Sandys and 3 Twin Hopper Handy Sandys. These units make sand conditioning and handling practically automatic thereby saving many manhours in the production of Brass and Aluminum Pressure-Tight castings. It is only necessary to dump the molds on the vibrating shakeout deck of the Reddy Sandy. The sand continues automatically through screening, magnetic separation, tempering and a double aeration until it is deposited in the hopper of the Handy Sandy for convenient use by the molder.

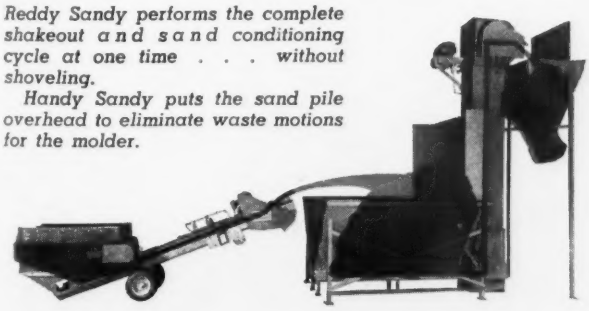
Mr. Wilbert K. Nelson, General Manager says: "To date we have encountered no hot sand problems as might be expected from these closely coupled units. The watering device has worked efficiently and sand is furnished to the molder in better condition than ever before.

"Our production has increased impressively especially on large molds, and in addition the molders and shakeout men are well pleased and less tired than formerly.

"To turn out the tonnage we are now able to produce would take twice the floor space with our former method of operation."

Reddy Sandy performs the complete shakeout and sand conditioning cycle at one time . . . without shoveling.

Handy Sandy puts the sand pile overhead to eliminate waste motions for the molder.



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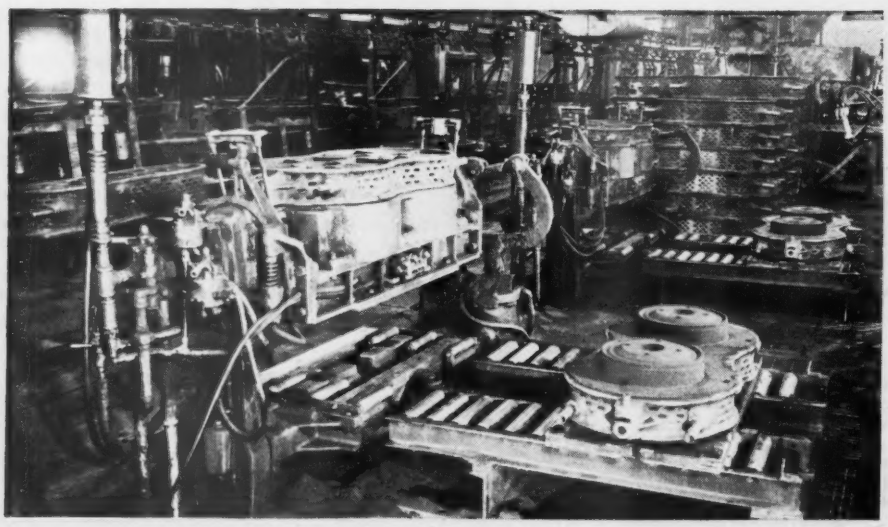

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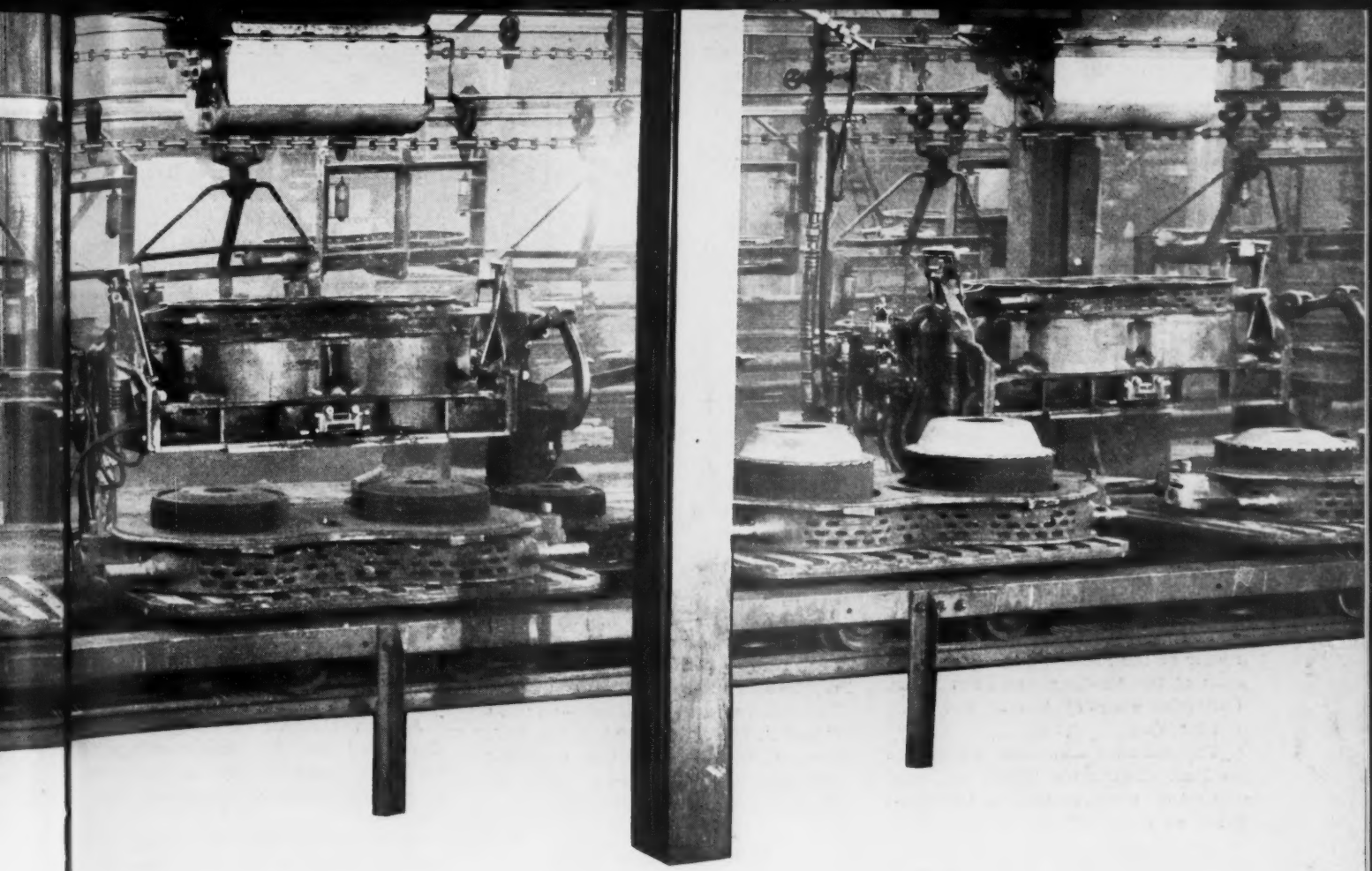

on of drag moulds *with*

OSBORN JOLT-ROLLOVER SQUEEZE PATTERN DRAW MOULDING MACHINES

HERE'S how production and semi-production foundries have increased output and lowered manufacturing costs of drag moulds. Squeezing either eliminates or materially reduces hand ramming time. The center of gravity rollover combined with roller conveyer discharge permits operator to make a complete mould from one side of the machine.

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Activities of Foundry

GROUPS

Ontario

AT THE regular meeting of the Ontario Chapter of AFS, Feb. 22, at the Royal York Hotel, Toronto, the AFS film "Fluid Flow in Transparent Molds," was shown and discussed by S. C. Massari, technical director of the society. Technical chairman of the meeting was John Allan, Callander Foundry & Mfg. Co., Ltd., Guelph, Ont.

The meeting also was designated as Past Chairmen's Night, and past chairmen were seated at the head table as small tribute to their work in the chapter's development. A special guest was J. J. McFadyen, Galt Malleable Iron Co., Galt, Ont., a national director of the AFS, who outlined some of the plans for the 1952 Foundry Congress and Show to be held in Atlantic City in May.

Three discussion groups were arranged for the Jan. 25 meeting of the Ontario Chapter.

Sand reclamation was discussed by the gray iron group at which Roy W. Bennett, Hydro-Blast Corp., Chicago, was speaker and C. Maddick, Massey-Harris Co. Ltd., Brantford, Ont., was chairman.

The malleable group had Ralph Green, Semet-Solvay Co. Ltd., Detroit, as speaker, with C. A. Thompson, Galt Malleable Iron Co. Ltd., Galt, Ont., as chairman.

The nonferrous group submitted questions in writing along with sample castings to a panel of experts. The panel included: G. M. Johnston, Neptune Meters Ltd., Long Branch, Ont.; W. A. Jones, Canadian Westinghouse Co. Ltd., Hamilton; Len Humphreys, A. H. Tallman Bronze Co. Ltd., Hamilton; and J. W. Bell, Aluminum Co. of Canada Ltd., Long Branch. Chairman was Frank B. Diana, Wagman & Son Ltd., Toronto, Ont. This meeting attracted 225 members and guests. — *C. A. Thompson, Galt Malleable Iron Co.*

Western New York

THE subject of "Gating and Risering" was discussed at the Feb. 1 meeting of the Western New York Chapter of AFS by Harry H. Kessler, Sorbo-Mat Process Engineers, St. Louis.

He pointed out the primary purpose of the riser is to supply feed metal for metal shrinkage. He prefers side risers wherever possible for this purpose, and eliminates top risers entirely. He pointed out that prong risers are effective because the sand between the prongs becomes as hot as the risers. Mr. Kessler stated that gates should be as small as possible and still allow the metal to flow at its fastest rate.

In conclusion, the speaker suggested that foundrymen ask themselves these questions: Will composition lick the problem; can risers correct the problem? He stated that chills should be used only as a last resort. If the problem continues, he suggested returning the casting to the engineering department for redesign. Martin J. O'Brien, Symington-Gould Corp., was technical chairman.—*Marve Taublieb, Frederic B. Stevens Inc.*

Tri-State

THE film "Foundry Mechanization," produced by Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, was presented at the Feb. 15 meeting of the Tri-State Chapter, AFS, at the Woodland Wing Country Club, Tulsa, Okla. Approximately 50 members and guests were present. C. V. Nass, vice president, Beardsley & Piper, narrator for the film, pointed out that proper mechanization of any foundry is peculiar to that foundry.

At the business meeting, it was announced that the chapter will join with the Texas Chapter in planning a regional foundry conference this fall.

The chapter's January meeting was held at Hotel Burlingame, Bartlesville, Okla., with Elmer C. Zirzow, Werner G. Smith Co., Cleveland, the featured speaker. His subject was "Casting Defects."—*J. G. Winget, Reda Pump Co.*

Northwestern Pennsylvania

THE movie, "The Brass Trail," prepared by British foundrymen visiting brass foundries in the United States, was shown at the Jan. 28 meeting of the Northwestern Pennsylvania Chapter of the AFS. Special guests were Martin J. O'Brien Jr., Symington-Gould Corp., Depew, N.Y., a national director of AFS, and Herbert Scobie, editor, *American Foundryman*. Principal speaker was Fred

(*Continued on page* 180

ONTARIO Chapter of the AFS held sectional sessions at its Jan. 25 meeting, Royal Connaught Hotel, Hamilton, Ont. Photos by courtesy of J. Richardson, Wm. R. Barnes Co.

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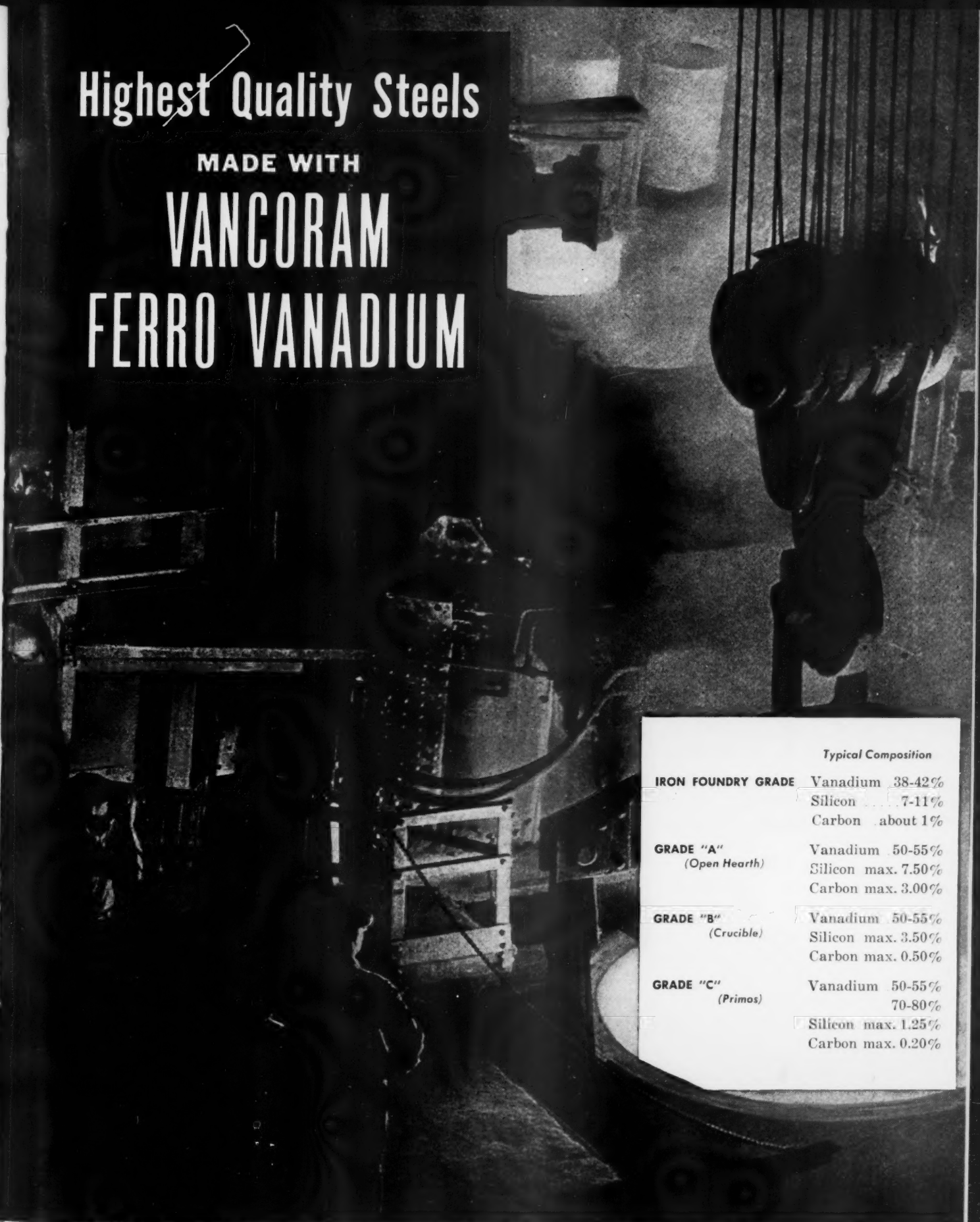

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IRON FOUNDRY GRADE	Vanadium 38-42% Silicon 7-11% Carbon about 1%
GRADE "A" (Open Hearth)	Vanadium 50-55% Silicon max. 7.50% Carbon max. 3.00%
GRADE "B" (Crucible)	Vanadium 50-55% Silicon max. 3.50% Carbon max. 0.50%
GRADE "C" (Primos)	Vanadium 50-55% 70-80% Silicon max. 1.25% Carbon max. 0.20%

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CHEMICALS AND METALS

NORTHWESTERN PENNSYLVANIA Chapter of the AFS met at the Moose Club, Erie, Pa., Jan. 28. Shown at the meeting, left to right, are: Martin J. O'Brien Jr., Symington-Gould Corp., national AFS director; Fred Carlson, Weil-McLain Co., acting chapter chairman, and Fred G. Sefing, International Nickel Co., who spoke on "The Foundry's Responsibility in an Educational Program"

(*Continued from page* 178)

G. Sefing, International Nickel Co., New York, who spoke on "The Foundry's Responsibility in an Educational Program."

Mr. Sefing stressed the need for an educational program in foundries since, even with modern equipment, production still requires skilled labor. In addition, there must be good labor relations, supervision and management. He stated that the chapters can do much in the education of young people in the schools but suggested that the foundries invite young people through the shops to show them that a foundry is a good place in which to work.

The chapter's Feb. 25 meeting featured a talk by J. A. Wickett, Monsanto Chemical Co., who spoke on the shell molding process. Mr. Wickett illustrated with slides the equipment necessary in the process. He pointed out that with mechanized equipment it is possible to produce more molds with better finish and with closer tolerances. He recommended gray iron or hard bronze for patterns and suggested the use of the process only for production items which would warrant the cost of expensive patterns. He recommended silica sand of 120-125 fineness mixed with 6 per cent resin.

In gating, runners must be smaller than conventional sand mold gating, and feeders also are correspondingly smaller. In pouring metals that slag easily, a slag trap or skimmer should be used. Experience has indicated that sand gives the best results for backing the shells. A two-hour discussion period followed Mr. Wickett's talk.—*Roy A. Loder, Erie Malleable Iron Co.*

TOLEDO Chapter of the AFS held International Night Feb. 13 at the Toledo Yacht Club. Shown at the meeting, left to right, are: Victor Zang, vice president, Unitcast Corp., Toledo, O.; J. L. Tillman, president, Unitcast; I. R. Wagner, national AFS vice president, and J. A. Mescher, Unitcast, chapter chairman. Photo by courtesy of G. Grotts, Unitcast Corp.

Toledo

APPROXIMATELY 75 members and guests were present at the International Night gathering held by the Toledo Chapter, AFS, Feb. 13, at the Toledo Yacht club. John A. Mescher, Unitcast Corp., Toledo, and chairman of the chapter, presided.

Vincent J. Sedlon, Master Pattern Co., Cleveland, and national director of the society, spoke briefly on the value of membership in AFS, citing his own experience. William W. Maloney, secretary-treasurer, AFS, Chicago, urged all to attend the annual convention and exhibition to be held at Atlantic City, May 1 to 7. He said that all exhibit space had been sold, and more operating exhibits were scheduled than heretofore. Also several hundred foreign visitors were expected in addition to a large attendance from this country. An excellent technical program also will be provided.

I. R. Wagner, Indianapolis, vice president of AFS, gave a thumbnail sketch of the activities of the society, pointing out that they primarily are due to participation of about 900 members on various committees. He described briefly the various research projects of considerable interest to the foundry industry which these committees are sponsoring. In addition, the various chapters play an important part in the society since they provide a close tie-in on local and national levels.

The meeting closed with an interesting sound-motion picture, "This Is Aluminum," prepared by the Aluminum Co. of America. — *Edwin Bremer.*

Washington

CONSIDERABLE interest in brass and bronze foundry problems was evident at the January meeting of Washington Chapter of the AFS, when William Romanoff, vice president, H. Kramer & Co., Chicago, spoke on "Brass and Bronze Foundry Practice."

Good foundry practice is essential for successful production of special alloy castings and includes gating, melting, correct pouring temperature, sand, equipment and metal. Faulty practice in the first three of these points accounts for 90 per cent of losses in the brass and bronze foundry.

(*Continued on page* 182)

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CENTRAL INDIANA Chapter of the AFS heard Prof. C. T. Marek, Purdue University, West Lafayette, Ind., speak on "Casting Design for Economical Production in the Engineering Curriculum" at its Feb. 4 meeting. Shown left to right, are: Paul Ulmer, Link-Belt Co., Indianapolis; Professor Marek; I. R. Wagner, national AFS vice president; H. A. Bolz, head, department of general engineering, Purdue University, and Carl Schopp, Link-Belt Co., chapter vice chairman. Photo courtesy of Henry O. Yeager, International Harvester Co.

(*Continued from page* 180)

Mr. Romanoff said that, to avoid hydrogen gas pockets in castings, it is mandatory to melt with an oxidizing flame. He also emphasized the importance of fast melting and immediate pouring for best results. The lowest temperature at which a casting can be poured without misruns or internal shrinks is the best pouring temperature. However, feeding is sometimes improved by a pouring temperature slightly higher than the lowest temperature at which the job will run. Correct temperatures must be determined by trial over a reasonable period.

Aluminum bronzes are important nonferrous alloys requiring special attention in feeding and chilling for successful production. Aluminum content above 9.5 per cent makes the metal very brittle. Slow cooling also produces a self-annealing tendency. Solution heat treatment at 1600° F, quench and anneal at 900° to 1100° and air cool will produce maximum properties in this alloy.—*Harold R. Wolfer, Puget Sound Naval Shipyard*

New England

AT the Feb. 13 meeting of the New England Foundrymen's Association, attended by 130 members and guests, and held at Hotel Somerset, Boston, M. W. Demler, Harbison-Walker Co. refractory engineer, presented a review of basic cupola operations.

He advised there are approximately 50 foundries now operating basic cupolas, and described the types of basic refractory brick used. Basic cupolas are advantageous in producing ductile iron where low sulphur is required. Also included in the discussion was information on patching material, slag holes, sand bottoms and the cost of basic operation versus that of acid.—*Myron DeHollander, General Electric Co.*

Quad City

MORE than 100 members and guests of Quad City Chapter of the AFS braved snow and sleet on Jan. 21 to attend the meeting at which H. K. Briggs, sales metallurgist of Miller & Co., Chicago, spoke on "Cupola Practice."

The speaker considered cupola operation from both technical and practical viewpoints, bringing out advantages and disadvantages of variations in cupola construction such as balanced blast, front slagging and others. He also described briefly the basic-lined cupola and stressed the importance of obtaining more information regarding slag composition and its formation both in basic and acid lined cupolas. Slides were used to illustrate the discussion, and Martin Liedtke, foundry superintendent, Farmall Works, International Harvester Co., served as technical chairman of the meeting.

Principal speaker at the chapter's Feb. 18 meeting, held at the Fort Armstrong Hotel, Rock Island, Ill., was Bruce L. Simpson, president, National Engineering Co., Chicago. Mr. Simpson's subject was "Development of the Metal Casting Industry," the text following closely the material published in his book of the same title. Mr. Simpson effectively outlined and illustrated with slides the early stages and growth of the industry through the various civilizations. He traced the industry's development to 1896, the year the AFS was organized. Hyman Bornstein, Deere & Co.,

MICHIGAN STATE COLLEGE Chapter of the AFS was guest of Eaton Mfg. Co., Vassar, Mich., Jan. 21 for dinner and a plant tour. Students met with company officials for a chicken dinner at Frankenmuth, Mich., where Paul Olsen, company personnel director, introduced the Eaton technical staff, gave a brief history of the company, and outlined operations at its foundry. After dinner the group toured the plant and concluded with a discussion period conducted by Arthur Waterhouse, plant manager

introduced Mr. Simpson.

In addition, the film, "The ADM of Cores," produced by Archer-Daniels-Midland Co., was presented.—*Eric Welander, John Deere Malleable Works*

Pittsburgh

APPROXIMATELY 125 members and guests of the Pittsburgh Foundrymen's Association were present at the Feb. 18 meeting held at the Fort Pitt Hotel. I. W. Sharp, American Steel Foundries, Verona, Pa., was the principal speaker.

Mr. Sharp presented a paper, originally prepared for the Electric Furnace Steel Conference, entitled "Acid vs. Basic Practice for Castings." He stated there is not much difference in the ease of meeting chemical specifications with the two practices. Since all acid electric heats at his plant are tapped at high temperatures, it is difficult to control silicon, and manganese control is more difficult than carbon control. In basic electric practice, manganese is the most difficult to control and silicon the easiest.

In an investigation conducted by the research laboratory comparing the fluidity of single-slag basic grade B steel produced at the Verona works with heats of acid steel produced at the Indiana Harbor works, it was found that the basic electric steel has less fluidity than does acid electric steel of the same general chemical composition; the difference is greatest at low mold-entering temperature and decreases as the mold-entering temperature increases.

The speaker compared refractory costs for the two types of furnaces and stated the furnace maintenance costs based on a net-ton charge ran 3 cents per ton higher on the acid furnace than on the basic furnace.—*Dan Reebel*

Reading

TWO roundtable discussions were arranged by the Reading Foundrymen's Association for its Jan. 15 meeting held at the Berkshire Hotel, Reading, Pa. Leading the discussion in the brass and bronze group were Robert A. Colton and Donald L. LaVelle, American Smelting & Refining Co.

Dealing with questions submitted by the members, the first subject considered was porosity. Alloys which freeze like copper in a narrow freezing range, such as manganese and aluminum bronzes, shrink down deep so that the condition is apparent; however, those which freeze over a wide range, such as tin bronzes, are more difficult to feed properly since dendrite formation interferes with directional solidification. This type of shrinkage is not apparent on visual inspection but is troublesome when machining removes the denser dendrite layers. Gas porosity in bronze castings is mostly due to steam formation. Gas porosity in aluminum and its alloys is from hydrogen absorption; to minimize this it was suggested not to overheat the metal nor chill it if overheated, pour at the lowest possible temperature and avoid turbulence during pouring and in the gating system.

Government agencies are specifying aluminum bronzes more frequently because of their high physical properties and the possibility of increasing those properties by quench and temper treatments. However, they are more difficult to handle than manganese bronze since they are susceptible to hydrogen porosity and dross readily. Physical properties differ little over a wide pouring temperature range of 1900-2300° F, and depend on alloy content primarily. In the heat treatment of aluminum alloys, it is important to stay

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SOUTHERN CALIFORNIA Chapter of the AFS met at Rodger Young Auditorium, Los Angeles, Feb. 8. Principal speaker was C. A. Sanders, American Colloid Co., left. Awards in the apprentice patternmakers' contest were made at this meeting. At right, left to right ,are: Phil Campbell, first place winner; Donald Bonk, second place; Lee Sanders, third place; Peter Meursinge, and Don Kidson. Photos by courtesy of Ken Sheckler, Calmo Engineering Co.

within the narrow temperature ranges specified for the various alloys.

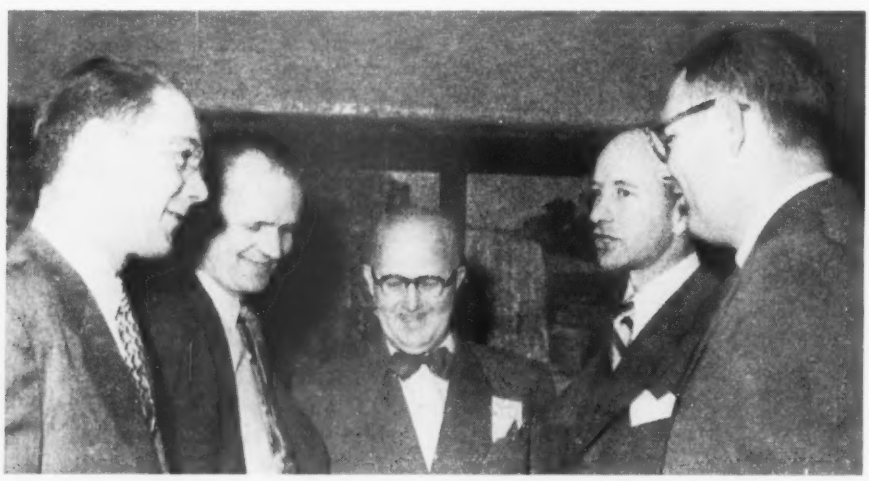
Discussion leaders for the gray iron group were Clifton Merkert and Charles Mooney, Olney Foundry Division, Link-Belt Co., Philadelphia. Subjects discussed included cause of back-pressure in a 66-in.-diam cupola; selection of sand; resin vs oil core binders; procedure for producing flat covers and the elimination of warpage; and causes of shrinkage in gray iron castings.—*Werner Finster and Joseph Grenko, Textile Machine Works*

Southern California

THERE were 135 members and guests present at the Feb. 8 meeting of the Southern California Chapter of AFS, held at the Rodger Young Auditorium, to hear C. A. Sanders, vice president, American Colloid Co., Chicago, discuss foundry sands.

Mr Sanders dealt chiefly with the control of metal shrinkage by proper use of molding sand, and outlined effects of various molding materials and their relationships in overcoming or helping to produce, casting defects. Factors of greatest importance, especially with gray iron castings, are the sand and binder used, amount of ramming, moisture content and temperature. The greatest shrinkage problem is caused by over-tempered sands. To illustrate his talk, Mr. Sanders used a film and slides prepared in conjunction with Michigan State College and Buick Motor Division of General Motors Corp.

The meeting also featured presentation of apprentice patternmaking awards. The first prize of $25 was won by William Campbell, Campbell & Matyshak, Whittier, Calif.; $15 second prize was awarded to Donald Bonk, Firestone Pattern Works; and third prize was won by Lee Sanders, Santa Monica Technical School, Santa Monica, Calif.—*Alfred A. Grant III, Grant & Co.*



TWIN CITY Chapter of the AFS met Feb. 12 to hear a talk on shell molding by Richard Herold, foundry products department, Borden Co., New York. Left to right, are: C. Fred Quest, J. F. Quest Foundry Co., Minneapolis, chapter chairman; Richard Wilson and J. W. Costello, American Hoist & Derrick Co., St. Paul; Mr. Herold, and Fred DeMoney, Engineering Experiment Station, University of Minnesota, technical session leader. Photo by courtesy of Lou Lund, Archer-Daniels-Midland Co., Foundry Products Division

Central Michigan

REGULAR monthly meeting of Central Michigan Chapter of the AFS was held at the Hart Hotel, Battle Creek, Mich., Jan. 16. Thomas T. Lloyd, Albion Malleable Iron Co., Albion, Mich., and chairman of the chapter, presided and in turn introduced Frank Rote, Albion Malleable Iron Co., who served as technical chairman.

Principal speaker was Dr. Richard A. Flinn, professor of metallurgy at the University of Michigan, Ann Arbor. Subject of his talk was "Ductile Iron," in which he reviewed his work with that material and outlined its properties and the manufacturing problems involved.—*Richard H. Dobbins, Albion Malleable Iron Co.*

Twin City

MORE than 100 members and guests were present at the Feb. 12 meeting of the Twin City Chapter of the AFS at the Covered Wagon Restaurant, Minneapolis. Principal speaker was Richard Herold, manager, foundry products department, Borden Co., New York. His topic, "Shell Molding," was of particular interest to the foundrymen present and he encouraged them to take the necessary steps to evaluate the process. Cost for special patterns and other equipment usually runs about $400 to $1000.

Two additional technical sessions were held. One was on "Gating and Risers," led by Nathan Levinsohn, Minneapolis-Moline Power Implement Co.; the other was led by Fred DeMoney, University of Minnesota Testing Laboratory, and Al Holler, Twin City Testing & Engineering Laboratory, on the subject of physical and chemical properties of cast metals. —*J. D. Johnson, Archer-Daniels-Midland Co.*

Western Michigan

AT THE Feb. 4 meeting of the Western Michigan Chapter of AFS, attended by 130 members and guests, V. A. Crosby, Climax Molybdenum Co., Detroit, was principal speaker. His topic was "Factors Affecting the Physical Properties of Gray Iron." Mr. Crosby described the effects of alloys in varying amounts and in different combinations on the properties of test bars and castings. His talk was illustrated

(*Continued on page* 186)

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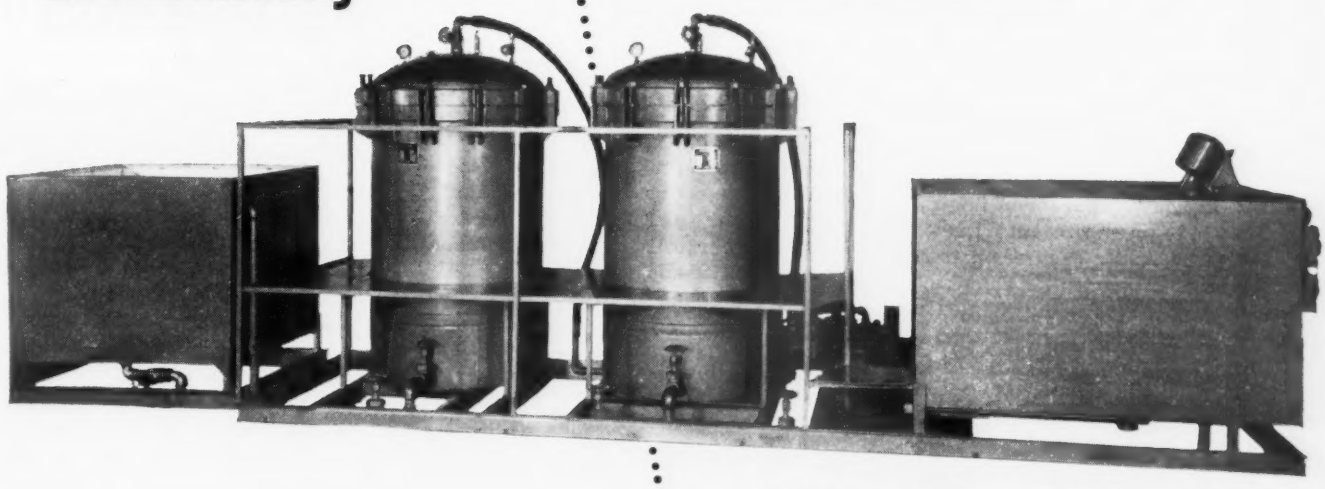

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WESTERN MICHIGAN Chapter of the AFS held management night Jan. 7 at the Cottage Inn, Muskegon, Mich. Shown there, left to right, are: C. H. Cousineau, Carpenter Brothers Inc.; William Geisler, Campbell, Wyant & Cannon Foundry Co.; Gerrit Witt, Holland Pattern Co.; Jerry Wallaston, Ajax Electrothermic Corp.; George Cannon Jr., Nugent Sand Co.; R. P. Shaffer, Lakey Foundry & Machine Co., and A. F. Pfeiffer, Allis Chalmers Mfg. Co., Milwaukee, speaker

(*Continued from page* 184)

with slides and graphs. William J. Cannon, Nugent Sand Co., Muskegon, Mich., introduced the speaker and R. P. Shaffer, Lakey Foundry & Machine Co., Muskegon, led the discussion which followed.

On Jan. 7, the chapter designated the meeting as "Management Night," and had 120 members and guests. Speaker was A. F. Pfeiffer, pattern division superintendent, Allis-Chalmers Mfg. Co., West Allis, Wis., who spoke on "Relationship of Pattern to Casting." Mr. Pfeiffer described how a pattern usually is made and contrasted this with how it should be made. He pointed to the need of pattern shop-foundry co-operation in designing patterns and also recommended the use of models to facilitate making patterns right the first time. In addition, Mr. Pfeiffer offered many suggestions on ways to increase production on plate-rigged small jobs. —*C. H. Cousineau, Carpenter Bros.*

Metropolitan

APPROXIMATELY 125 foundrymen from the district attended the Jan. 7 meeting of Metropolitan Chapter of the AFS to hear Prof. Howard Taylor of Massachusetts Institute of Technology discuss "Gating and Risering." Presiding was James S. Vanick, International Nickel Co., New York, who will serve as chapter chairman for the remainder of the season in the absence of D. F. O'Connor, who has gone to Europe.

Professor Taylor spoke generally on all cast metals. He first defined fluidity as being the ability of the metal to fill the mold completely. For a given metal it is affected primarily by temperature. However, Professor Taylor believes the fluidity spiral offers better control.

Gating systems should be designed to avoid turbulence which will entrap gases and dirt, causing dross and porosity. Some of the techniques he recommended to minimize turbulence are: Using the smallest size sprue practicable; avoiding square corners both horizontal and vertical; tapering sprues downward, streamlining the pouring basins; progressively decreasing cross section of runners and using strainer cores and skim dams.

The speaker strongly advocated use of insulating riser sleeves and riser topping compounds to increase riser efficiency. Interdendritic shrinkage caused by the long solidification range associated with certain metals can be corrected only by the use of chills, it was stated.

A question-and-answer session devoted to foundry problems was arranged by the Metropolitan Chapter of the AFS for its Feb. 4 meeting at the Essex House, Newark. Prof. William H. Reuten, Polytechnic Institute of Brooklyn, Brooklyn, N. Y., was discussion leader and the following comprised the panel of experts:

G. M. Etherington, American Brake Shoe Co., Mahwah, N. J., sand; Anthony Cristello, American Light Alloys Inc., Little Falls, N. J., light alloys; Harry H. Kessler, Sorbo-Mat

(*Continued on page* 188)

NORTHEASTERN OHIO Chapter of the AFS saw a skit entitled "Pattern & Foundry Engineering" at its regular monthly meeting Feb. 14 at Tudor Arms Hotel, Cleveland. The skit portrayed progress of a casting order from blueprint to delivery of the finished casting. All actors were from Aluminum Co. of America, except the customer, Knut O. Keel, chief engineer, Cleveland Diesel Engine Division, General Motors Corp. The entire cast is shown on the stage during one of the acts. Left to right, are: Louis Schmidt, Harry Hillstrom, P. B. Jackson, Mr. Keel, Dan O'Donnell, Jack Kroecker, George Gedeon, A. L. Robertson and Paul Nielsen. Commentary during the presentation was by A. H. Hinton, plant manager, Cleveland Sand Foundry, ALCOA. Photo courtesy of John H. Garner, Alcoa

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(*Continued from page* 186)

Process Engineers, St. Louis, gray iron; Rod O'Conner, Cooper Alloy Foundry Co., Hillside, N. J., steel; and R. A. Colton, American Smelting & Refining Co., Barber, N. J., brass and bronze.—*W. T. Bourke, American Brake Shoe Co.*

MIT

RECENT meetings of the Massachusetts Institute of Technology Student Chapter of AFS included talks by Dr. E. I. Valyi, Shell Molding & Machine Co., New York, who spoke before the group Dec. 5. He discussed major developments in the shell molding process during 1951.

At the Nov. 7 meeting, Donald J. Reese, International Nickel Co., spoke on "Ductile Iron and Basic-Lined Cupolas." Mr. Reese believes that a major step will be ductile iron production in the cupola, rather than the ladle method now used. Oct. 15, Prof. Howard F. Taylor discussed opportunities in the foundry and the need for application of scientific methods to foundry practice.—*G. D. Chandley*

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Canton

NON-DESTRUCTIVE Testing with X-Ray and Radium" was discussed by Royal G. Tobey, Eastman-Kodak Co., Rochester, N. Y., at the Feb. 7 meeting of Canton District Chapter of the AFS. Using slides to illustrate his talk and presenting a film entitled "X-Ray Inspection," the subject proved of considerable interest to the 71 members and guests present. C. B. Williams, Massillon Steel Castings Co., and chapter chairman, presided. A. O. Prentice, Stark Foundry Co., introduced the speaker.

The Mar. 6 meeting of the Canton District Chapter of the AFS was held in Alliance, O., with approximately 100 members and guests present. In addition to the principal speaker, Frank G. Steinebach, editor, FOUNDRY, special guests at the meeting included Walter L. Seelbach, president; William W. Maloney, secretary-treasurer, and Vincent J. Sedlon, national director of the American Foundrymen's Society. Topic of Mr. Steinebach's discussion was "The Foundry in the Mobilization Program."

In addition to the regular meeting, a luncheon was held at the Canton Club, Canton, O., at which executives of member companies were able to get acquainted with the national AFS officers and Mr. Steinebach.—*William T. Cole, Canton Malleable Iron Co.*

Pine State

TWO speakers were featured at the Feb. 14 meeting of the Pine State Foundrymen's Association held in Portland, Me. Edwin G. Walker, prominent Maine sociologist, talked on the vagaries and personalities of the major groupings of employees encountered in foundries or other businesses. He was followed by Walter Jaeschke, Whiting Corp., Harvey, Ill., who spoke on "Cupola Operations in the Small Foundry." In the discussion period which followed, many melting problems were described and Mr. Jaeschke offered helpful suggestions for minimizing the problems.

The association's next meeting will be held Apr. 10.—*Walter A. Sokolosky, Saco-Lowell Shops*

Rochester

THROUGH the courtesy of Wesley C. Stott, the premier showing of the motion picture, "Master of Fire and Servant of Industry," produced by A. P. Green Fire Brick Co., Mexico, Mo., provided the Rochester Chapter of AFS with an interesting program at its Feb. 5 meet-

(*Continued on page* 190)

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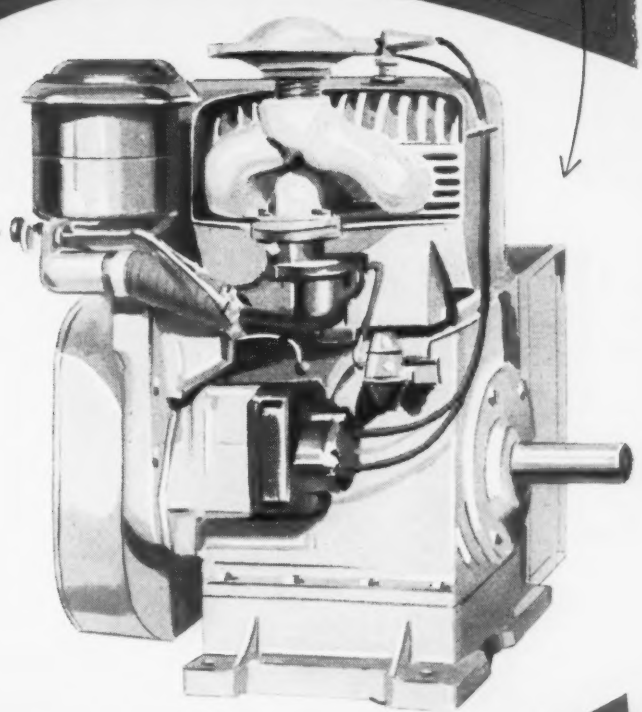

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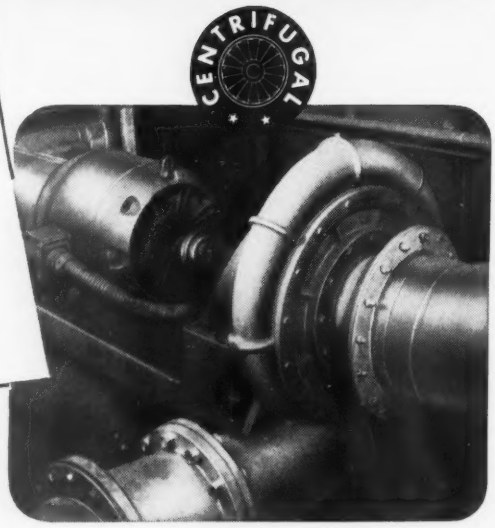

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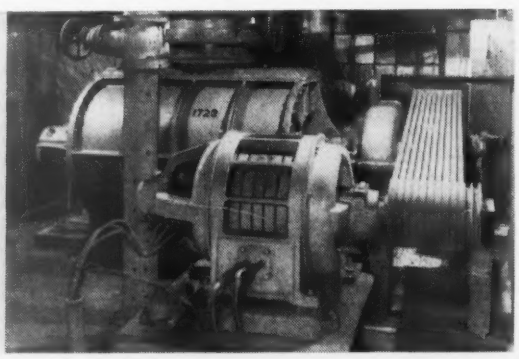

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(*Continued from page* 188)

ing. The film illustrates steps in the manufacture of firebrick and refractory materials from the mine or pit to the installation of the finished product under actual use. The picture is well conceived and clearly narrated. —*Herbert G. Stellwagen, Hetzler Foundries Inc.*

Eastern New York

A DISCUSSION on "Core and Mold Blowing" by Lawrence D. Pridmore, International Molding Machine Co., La Grange Park, Ill., featured the Feb. 19 meeting of the Eastern New York Chapter of AFS. Mr. Pridmore stressed the need for proper vents in coreboxes and large enough blow holes for the type of sand being used and the type of core to be blown.

Prof. Scott Mackay, Rensselaer Polytechnic Institute, Troy, N. Y., reported on the recent meeting of the Foundry Educational Foundation in Cleveland.—*Robert A. Rege, Eddy Valve Co.*

Eastern Canada

BRING your Boss" was the slogan for the Feb. 8 meeting of the Eastern Canada Chapter of the AFS at the Mount-Royal Hotel, Montreal, and many members brought as guests top executives of their companies. The chapter's directors also each brought a guest executive.

As a result a capacity audience was present to hear Bruce Simpson, president, National Engineering Co., Chicago, who gave a most interesting talk on "The History and Development of the Foundry Industry." Chapter Chairman Turney Shute presided.—*A. E. Cartwright, Crane Ltd.*

Central Indiana

AT the Feb. 4 meeting of the Central Indiana Chapter of AFS, I. R. Wagner, Electric Steel Castings Co., Indianapolis, and a national director of AFS, discussed the International Foundry Congress and Show to be held in Atlantic City.

Principal speaker was Prof. C. T. Marek, Purdue University, West Lafayette, Ind. In discussing "Casting Design for Economical Production," Professor Marek stated that the proper design of castings should come from the designing engineer, but that he must be familiar with design problems of the foundry. The speaker would like to see all engineering students trained in casting design as part of their college education. Since preparation of a presentable

(*Concluded on page* 192)

The hard, cold facts about Pittsburgh's hot furnaces!

47 PLANTS OKAY THE HEAT PROVER

Pittsburgh's great steel industry needed an instrument to measure air infiltration, to check air requirement and fuel-air ratio controls in open-hearth furnaces . . . an instrument to check the stoves in which blast-furnace air is heated . . . to check precise atmospheres in soaking pits . . . to control fuel waste and precise atmospheres in processing furnaces.

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CITIES SERVICE

(*Concluded from page* 190)
course on this subject requires much research, he requested the co-operation of the industry in sending to him case histories of castings where design change has helped the foundry.

Laboratory method of producing shell molds was demonstrated to 104 members and guests of the Central Indiana Chapter of AFS at the Mar. 3 meeting held at the Athenaeum Turners, Indianapolis. The demonstration was made by Fred Carl, Arthur Anderson and William Hollar, Fabricast Division of General Motors Corp., who also conducted a panel discussion on the process. In their opinion, shell molding is not a replacement of present foundry methods but has a definite place in the industry in a manner comparable to that held by investment casting or permanent molding.

The educational committee of Central Indiana Chapter sponsored a special training program Feb. 21-23 designed to explain actual foundry applications of statistical quality control and to demonstrate the practical use and interpretation of its methods. Allen A. Evans, foundry quality control engineer at International Harvester Co., Indianapolis, was conference leader. The course also included a trip through the foundry so those participating could see foundry quality control principles applied. —*Paul V. Faulk, Electric Steel Castings Co.*

Chesapeake

A FOUNDRY sand school, sponsored by the Chesapeake Chapter of AFS, was held at Johns Hopkins University, Baltimore, Feb. 25-27. The course, covering properties and the testing of sand, was presented by Frank S. Brewster, Harry W. Dietert Co., Detroit, and more than 50 participated—*Joseph O. Danko Jr., Arlington Bronze & Aluminum Corp.*

Book Review

Typical Microstructures of Cast Iron, cloth, 55 pages, 8¾ x 11¼ inches, published by the British Cast Iron Research Association, Alvechurch, Birmingham, England. Price 15s to members of the association; £1.0 to nonmembers.

This volume is intended as a practical tool for use by foundry metallurgists, engineers and any user of iron castings who requires to estimate how far a given structure is likely to meet specified requirements. It provides for reference and comparison a series of photomicrographs of the principal types of cast iron normally encountered in daily work, at customary magnifications.

A technical introduction indicates the dependence of the structure and properties of cast iron on cooling rate and composition, and considers separately the mode of occurrence and appearance of the constituents of cast iron. Photomicrographs, 41 in number, are of large size and are accompanied in each case by an explanatory text on the facing page. They are grouped under constituents of cast iron, unalloyed cast irons, special and alloy cast irons, and malleable cast irons. A few micrographs illustrate some of the commoner defects encountered.

Sand School Is Offered

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, will present its sand school program Aug. 11-13 at the Engineering Society, Detroit. To be presented by Frank S. Brewster, the course will cover application of practical sand control to foundry operations. Reservation requests for the course should be addressed to the company.

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INDUSTRIAL DUST CONTROL

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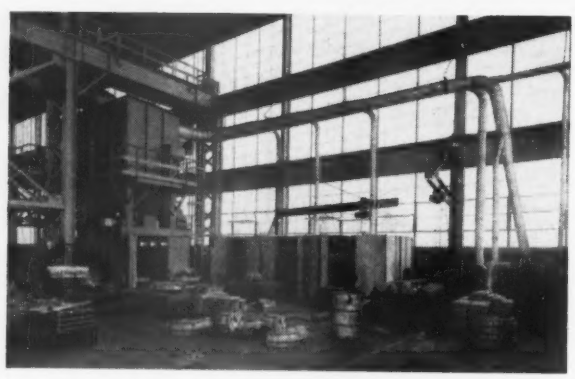

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You, too, may have a dust problem as did this foundry before the installation of Sly Dust Control.

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The Sly Dust Filter (shown at left) handles the dust created by a Sly Blast Room, grinder booths, and surface grinders. *The cleaned air contains no visible dust.*

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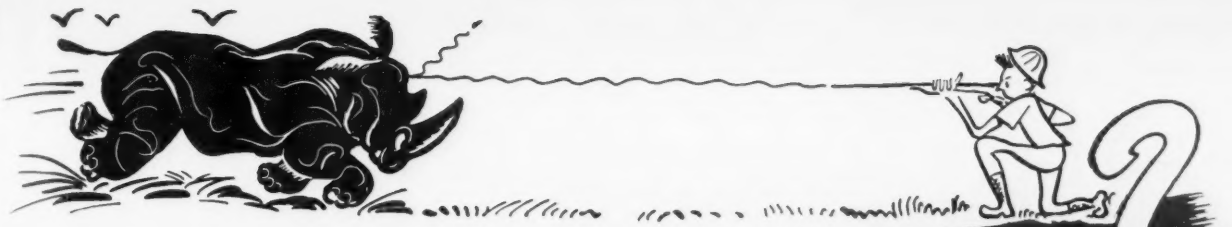

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CUSTOM BONDS: New, specially developed resinoid bonds are currently showing amazing reductions in snagging wheel costs, both through faster stock removal and longer wheel life.

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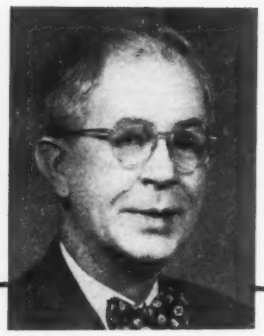
MAN-TO-MAN

on the Molder's Bench

"Pendulums and Panaceas"



By RALPH L. LEE

IN my travels I run into quite a few folks who seem to be surprisingly well informed on what is wrong with foundrymen, foundries and the foundry business but who have never worked in a foundry, let alone made and poured a mold. Not too long ago I heard a bright young fellow make a speech before a sizable group of seasoned foundrymen and I must say that, scattered among the faults he had found with the foundry, he did drop quite a few darned good thought provokers.

He hadn't gotten very far till I caught on that he was dead set against test bars in any shape or form. I must admit that for a moment he had me on the edge of thumbing my nose at the fickle things and feeling sorry for the poor misguided souls who still believed in them.

The point he was trying to make was that molten metal in the ladle hadn't the slightest idea as to how solid, grainy, bubbly, tough, hard or soft it was going to be when it finally settled down in some particular spot to cool off. He pointed out that even the most carefully made and tested bar couldn't possibly predict—for him at least—the physical characteristics he would finally get way down in some all-fired important section of a casting.

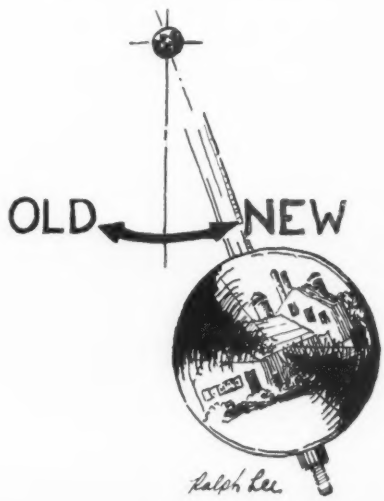
The thing that kindo' got me was not in what he said, but the way he said it, just as though the foundry folks he was talking to had never run into this amazing truth or, if they had, had either forgotten it or didn't give a whoop.

Even as an amateur working in the Lee Hobby Foundry, I couldn't see how anyone who had ever made even just a few castings could possibly miss learning the amazing Dr. Jekyll-Mr. Hyde tricks molten metal can pull off by cooling down in odd shaped spots.

I had all that I could do at this point to keep my big trap shut and from suggesting that if you couldn't tell lead, copper, aluminum, iron or steel apart from looking at them, test bars would be a mighty slick way of finding out, even though each of them varied all over the lot on the basis of where they were poured.

It then struck me as to what a horrible thing it would be if all that we have learned about metals and alloys from test bars and the progress we have made as a result of it was banished from the face of the earth and we were deprived of the progress we most certainly will make in the future with them.

This fellow went on to say that, as far as he was concerned, he would much rather have a test sample of metal sawed out of a casting at that critical spot than a whole armful of test bars. And again I couldn't help but think of the number of times that I, as an amateur, have done a bit of sawing myself in one of these critical spots. I couldn't for the life of me picture any foundryman who hadn't done the same thing at some time or another.



From this section business he swung over to land squarely on the necks of the designers and engineers who, as a cult, are bound together by concocting the uncastable castings we cast by the thousands and thousands of tons daily.

Waxing quite eloquent while viewing with alarm the lamentably low level of casting design, he made any number of darned good suggestions on how metal could be saved, castings improved and scrap reduced if the engineer, the patternmaker, the metallurgist, the machinist and the molder would wake up and get their heads together before the production prints were finally okayed.

Well! I said to myself that no one could possibly quarrel with this splendid ideal, for Heaven only knows that we all have been preaching this gospel since Hector was a pup, so much so that a person could hardly conceive of a foundryman who hasn't already been inoculated with it.

I haven't the slightest doubt that all of the foundrymen who heard my fine young fellow got some good out of what he had to say (I know that I did). But neither have I the slightest doubt that we all would have gotten one whale of a lot more if he had spent more time talking about his ideas than the deplorable state of affairs only he and his ideas could correct.

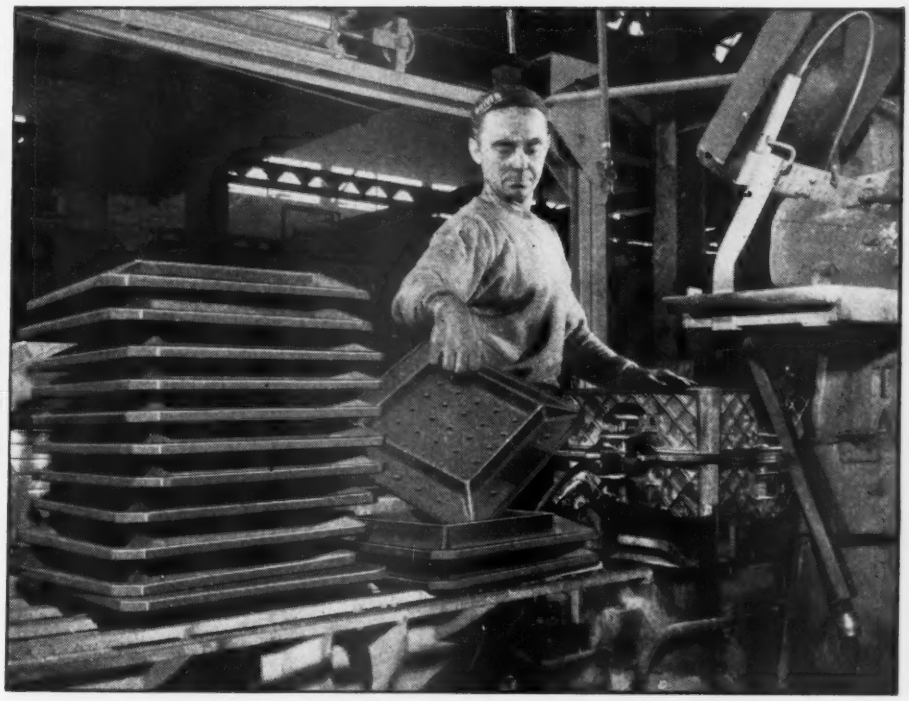
Then, too, I think he would have done a much better job of selling if he had stopped to think that regardless of how they managed to do it, imperfect foundrymen working with imperfect patterns, made from imperfect drawings, drawn by imperfect designers, corrupted by imperfect tool and production men, have turned out more castings for more useful things and services over the years than all the rest of the world put together.

In my humble opinion this splendid accomplishment did not come about from being shamed into facing the facts of foundry life or through tossing into the ash-can all that had gone before and swallowing hook, line, bait and sinker every panacea that comes along. In fact, I think

(*Concluded on page* 196)

"Burning and Breakage loss not a factor since using EDCO Dowmetal BOTTOM BOARDS"

...says Olney Foundry, LINK-BELT COMPANY, Philadelphia, Pa.



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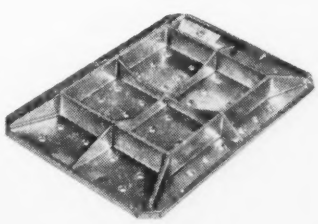
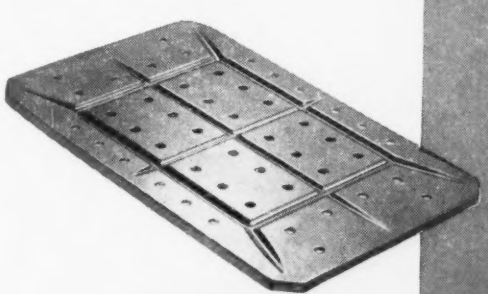
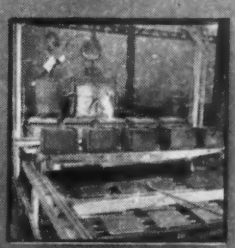




Olney Foundry was established in 1920 as a division of Link-Belt Company in Philadelphia, Pa. Olney Foundry produces gray iron castings of every description ranging in size from a few ounces to ten tons in weight. EDCO DOWMETAL Bottom Boards have been extremely helpful in maintaining the high degree of modern mechanization characteristic of Olney Foundry.

The illustrations at right show some of the foundry production equipment used by Olney Foundry to achieve their high degree of modern mechanization. The pallet-type gravity conveyor in the top panel shows molds on EDCO DOWMETAL Bottom Boards being moved to the pouring area. This pouring area is shown in the lower panel. The molds are automatically dumped after pouring and the EDCO DOWMETAL Bottom Boards are returned by the conveyor to the molder.



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(*Concluded from page* 194)

we can all agree that the batting average of most panaceas proposed down through the years hasn't been so hot. Some have not only failed to live up to the claims made for them, but have actually thrown us off the track for a while.

And another thing. I don't think any of us would be surprised if we found that most of the worthwhile progress we have made down through the years has come about just as much (if not more) through taking an inventory of the good things we had been doing and doing more of them and doing them better than repenting our sins and hitting the saw dust trail.

It strikes me that most of the seemingly new things which finally turn out to earn their salt also turn out to be improvements on the old, rather than replacements. The old pendulum swings wide once in a while with a shove from a rabbit out of the hat, then back she comes to settle the score for a more moderate beat.

In any event, a salesman, whether he be out on the road selling supplies, equipment or castings or in the shop selling an idea, is likely to raise the question as to whether his product is worth talking about if he talks more about his competition than he does his product. I guess I'd better quit this mooning around and get on up there in the Lee Hobby Foundry where I've left my shovel hanging in the air. But just the same, "You can catch more flies with sugar than you can with vinegar."

Belgian Technical Group Awards Medal

The Belgian Technical Association recently awarded the Medal of Honor to Marcel Borgerhoff for his devotion and enterprise as association president and for his part in organizing the International Foundry Congress at Brussels last September. Presentation was made by G. Halbart, senior vice president of the association.

On the same occasion, Mr. Borgerhoff conveyed thanks and congratulations of the council of the association to Ivan Lamoureux, association president in 1950, who has devoted his life's work to the foundry industry and to assocation development. Rene Deprez, first recipient of the Award of Honour of the International Committee of Foundry Technical Associations and a past president of the Belgian Association, has been promoted to Chevalier of the Order of Leopold.

Handling Equipment

(*Continued from page* 93)

other shakeout arrangements.

Power-driven mold conveyors are adapted to standardized work where cooling time of the castings stays within a specialized range. They require minimum floor space and power and can be made to travel in any path. Completed molds are placed on the conveyor, which carries them through the pouring, cooling and shakeout stations. Sand spilled during molding passes through grates in the floor and is collected by a belt conveyor in the pit. Maximum production can be obtained with minimum of molding equipment.

Cooling of molds is faster under the smoke hood, and the centralized pouring and shakeout operation simplifies the exhaust of fumes, dust and steam. The drives are variable speed to co-ordinate speed of the conveyor with mold production. This permits productivity of molders to be better controlled, and the continuous flow of castings from the shakeout to the cleaning room provides easier planning of finishing operations.

Have Two Main Groups

Mold conveyors may be divided into two main groups: Continuous, and semicontinuous or index type. Accompanying sketches illustrate typical arrangements. The location of molding machines on each loop depends on the kind of castings produced and molding method applied.

Fig. 12 shows the simplest arrangement of a continuous mold conveyor servicing a line of jolt-squeeze machines producing small castings made in snap flasks. Length of the mold conveyor loop and its speed depend upon production and cooling time required. The same belt distributing conveyor may be used if another line of machines should be installed on the opposite side.

Fig. 13 illustrates a cope and drag pin strip molding machines setup for medium-size mold made in tight flasks. Drag machines are located on the inside of one leg of the mold conveyor, cope machines on opposite side. Cores are set from outside of the conveyor loop. Castings removal takes place between shakeout stations.

Fig. 14 shows application of a continuous mold conveyor for mass production of small castings made in tight flasks of the same size. The short cooling time required for this particular type of castings permits higher speed of mold conveyor and

(*Continued on page* 200)

"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

"FALLS"
COPPER
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Promotes the following properties:

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"This Foundry is A Good Place to Work"

Locat[ed] since 1912 in the present Lebanon valley [area] of Penn[sylvania], this plant produces a wide range of qu[ality] steel castings. It is a pioneer in electric furnace melting. It is a good place to work for other reasons: Concrete flooring is used throughout the foundry; complete chemical control is provided for all materials; a policy of cleanliness and excellent overhead heating supplement[s] numerous windows on both sides of the plant; modern molding methods prevent congestion and promote safety; an elaborate sprinkler system makes the plant as fireproof as possible.

A number of our molding machines are used in this outstanding foundry. The 750 lb. Herman illustrated is typical. Operating features include: hydraulic pattern drawing; automatic equalizer to compensate for flask and bottom board irregularities; automatic lubrication; one rotary valve handle controls complete operation.

Wire, call or write the address below for complete details. Remember — Herman's range of machines are manufactured in capacities up to and including 140,000 lbs.

Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

The ad reproduced herewith originally appeared in the November, 1948 issue of FOUNDRY

MACHINES—

HELP MAKE THIS FOUNDRY A GOOD PLACE TO WORK *because—*

Mr. Thomas S. Quinn, Treasurer
and General Manager,
Lebanon Steel Foundry,
Lebanon, Pennsylvania

"Herman Molding Machines have been used on the bulk of our production for over 30 years. Many of these are over 20 years old, but still produce quality molds without excessive maintenance.

Herman jolt machines are the most rugged molding machines built today.

Herman's exclusive feature in its roll-over accomplishes the ideal in pattern draw by lowering the mold from the pattern. Deep pockets can be drawn. The mold itself will be accurate to dimension.

By time-study, especially on larger molds of 36"square and up we find a substantial saving in molding time."

The comments above were made recently by Mr. Thomas S. Quinn, Treasurer and General Manager of Lebanon Steel Foundry.

You, too, can put Herman Molding Machines to work in your foundry with similar results. They're simple to operate, automatically lubricated, have hydraulic pattern draw, and they've made their way by the way they're made.

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NATIONAL BENTONITE

It doesn't take a detective to find out that National Bentonite helps foundrymen make better molds. A great many expert foundrymen have used National Bentonite regularly for years to insure molds with high strength both green and hot, with minimum moisture content. This last point is important, since it means much less chance of gas holes and blows. Molds made with National Bentonite also yield castings with finer finish—and that's often important, too.

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Mr. Walter A. Zeis
Webster Groves, Missouri

(*Continued from page* 197)

location of the molding machines on both sides of the conveyor leg. As a result, the loop is shorter than usually required for the same number of molding stations.

This mold conveyor is equipped with a special shakeout conveyor operating in connection with revolving screening barrel. This equipment will be described with other shakeout arrangements.

The same conveyor is also equipped with mold weight and pouring conveyors as illustrated in Fig. 17. The weight conveyor is driven by a chain supported by an I-beam shaped to lower the weights onto the molds at the beginning of the pouring zone and to lift off at the end of the zone. The weight carriers are of hinged construction allowing independent action of weights when in contact with the molds. The flat-top apron pouring conveyor serves to carry the operators when pouring the molds. Speed of both conveyors is synchronized with the speed of the mold conveyor.

Combine Conveyor and Slinger

Layouts of mold conveyors operating in connection with sandslingers are shown in Fig. 15. Arrangement "A" is used for snap flask production on cope and drag machines located on a revolving turntable, and the sandslinger is used for continuous ramming of alternate drag and cope parts. The finished drag is transferred directly onto a mold conveyor on which core setting is done before reaching the station where the mold is closed. Then the snap flask is removed and each part returned to the respective molding machine. This principle permits a variety of patterns to be used simultaneously.

In the layout "B" two turntables are applied, one for producing drags, the other for copes. Each table, with molding machines for tight flask production, is serviced by a separate sandslinger. Rammed drags are placed on mold conveyor on which core setting is carried out. The molds are closed in front of the cope molding station.

Two basic layouts of a semicontinuous mold conveyor are shown in Fig. 16. Similarly as noted in the comparison between roller conveyor and pallet arrangement, the semicontinuous mold conveyor offers certain advantages over the continuous type. It has to be noticed however that both of the preferable mold handling systems are primarily destined for snap flask mold production.

The semicontinuous mold conveyor

consists of four separate trains operating in four separate zones — molding, pouring, cooling and shakeout. The first three zones are electrified and the trains in these zones are moved by motor-driven head cars. In the shakeout zone the trains are cut off from the current and are moved by a chain drive.

During the established operating cycle the completed molds are located on train No. 1, the jackets and weights are placed on molds of train No. 2 and the pouring operation performed. At the same time train No. 3, with previously poured molds, remains in the cooling tunnel, while train No. 4, with cooled molds, emerges from the tunnel and is moving slowly in front of the automatic shakeout station. As indicated, operations of the first three zones are performed while the trains are stationary, the last or shakeout operation while the train is in motion.

The difference between the layouts of Fig. 16 lies in the arrangement of the cooling zone. In layout "A" the cooling tunnel is narrow and the automatic switches permit shunting the mold conveyor trains into either of two tracks in the cooling tunnel. In layout "B" the tunnel is wider and a longer track line allows for cooling and shakeout operation. The second layout requires more space but less automatic control.

Using the semicontinuous conveyor the molds are placed on trays and poured while the trains are stationary. This is a big advantage as each molder is using the same tray of each train and consequently the molding equipment is returned to him. The molding station of the above described layouts is illustrated in Fig. 18.

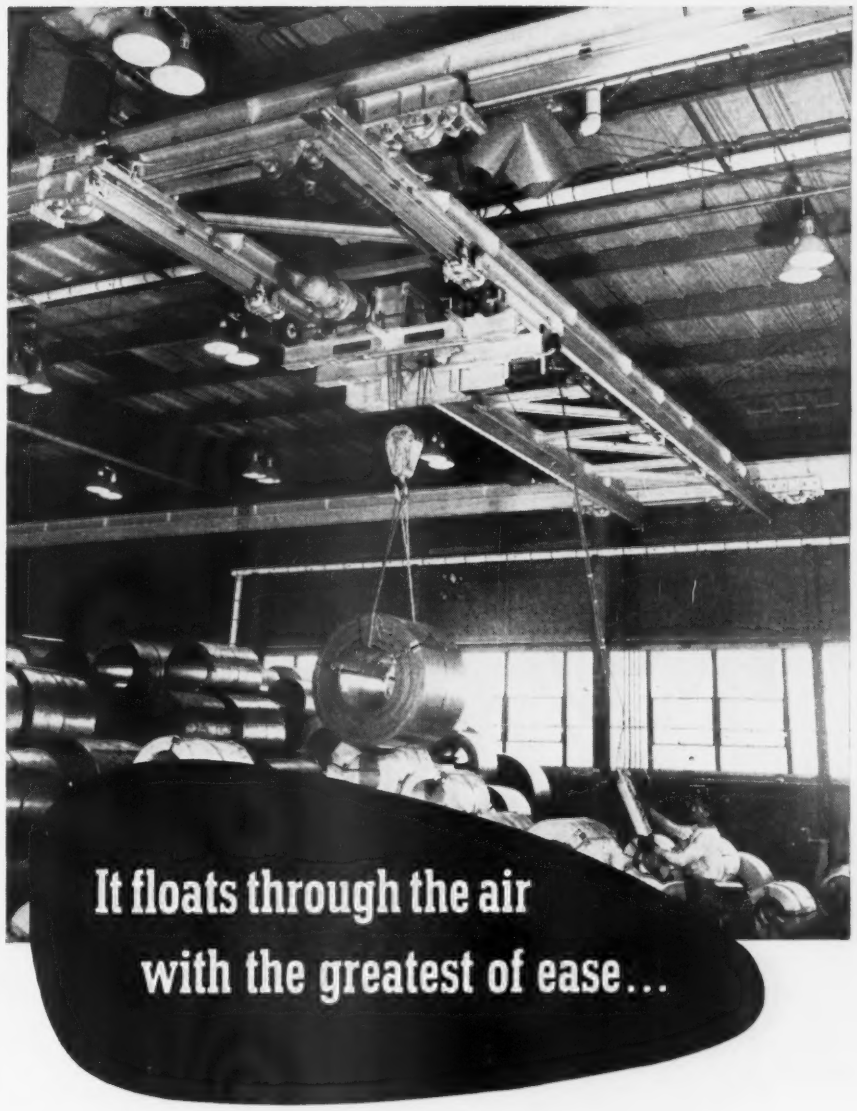
(To be concluded next month)

Book Review

1951 *Supplement to ASTM Book of Standards,* Part 2, Non-Ferrous Metals, paper, 346 pages, 6 x 9 inches, published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $3.50.

Includes revised standards and new and revised tentatives in the nonferrous metal field which have been accepted since the appearance of the 1950 *Supplement.* Twenty-four standards replace existing standards, and of 36 tentatives, 32 are replacements, 4 are standards which have been revised and reverted to tentative status, while 13 are published for the first time. The book also contains yellow stickers for attachment in the *Book of Standards* and the 1950 *Supplement* to draw attention to changes.

Of particular interest to the found-



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AMERICAN MONORAIL CRANES

One man easily unloads, stores and moves seven-ton coils of steel with this 10-ton American MonoRail Crane. These cranes furnish efficient operation where low headroom is a critical problem. Interlocking devices permit carrier to travel beyond craneways. Loads are moved over maximum area. Articulated trolleys assure perfect alignment of trucks for smooth crane travel. American MonoRail Cranes are ruggedly built to handle loads up to 10 tons at operating speeds of 500 feet per minute.

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ry industry are: B22-51, "Bronze Castings for Bridges and Turntables"; B61-51, "Bronze Castings, Steam or Valve"; B62-51, "Composition Brass or Ounce Metal Castings"; B80-51T, "Magnesium-base Alloy Sand Castings"; B93-51T, "Magnesium-base Alloys in Ingot Form for Sand Castings, Die Castings and Permanent Mold Castings"; B179-51T, "Aluminum-base Alloys in Ingot Form for Sand Castings, Die Castings and Permanent Mold Castings," and B199-51T, "Magnesium-base Alloy Permanent Mold Castings."

Handling Institute Starts Industry Service Plan

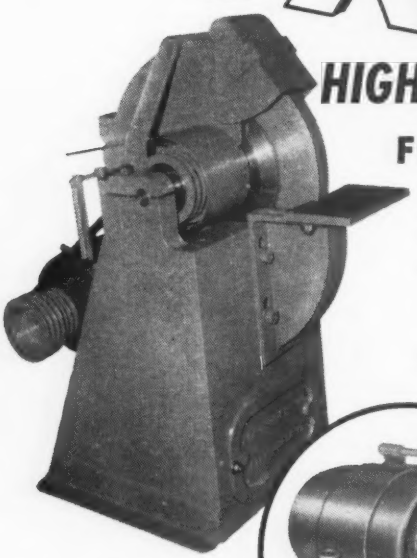
Material Handling Institute has launched an industry service plan to inform operating management of the economics, administration and modern technology of material handling. George R. Brockway, Rapids-Standard Co., Grand Rapids, Mich., is director of the plan with a committee of six authorities from materials handling equipment manufacturing firms.

Activities of the plan include closed workshop-type conferences between users and manufacturers facing common technical problems; articles and other contributions to trade, technical, and business publications; local conferences between representatives from leading local industries and an itinerant team of authorities on the economic, administrative and technological aspects of material handling; a speaker's bureau to provide presentations on material handling before trade and business associations and technical societies, and reports and surveys for distribution to industrial leadership groups.

American Material Handling Society and vertical associations of equipment manufacturers will co-operate with the institute to co-ordinate, extend and amplify the total effort.

FOX

HIGH-SPEED STAND GRINDERS



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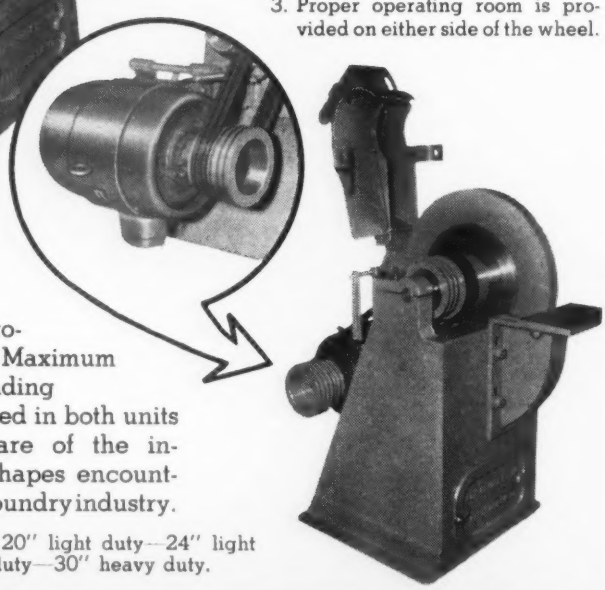
Three important reasons why FOX Grinders are designed as single-wheel machines:

1. Speed changes can be made at the proper wheel diameter.
2. Less space is required for each installation.
3. Proper operating room is provided on either side of the wheel.



These Stand Grinders have been designed for use in foundries where high-speed production is required. Maximum clearance at the grinding face has been provided in both units to properly take care of the innumerable casting shapes encountered throughout the foundry industry.

Comes in 4 sizes: 20" light duty—24" light duty—24" heavy duty—30" heavy duty.

FOX GRINDERS, Inc.

OLIVER BUILDING PITTSBURGH 22, PA.

Specification Developed For Nodular Iron

A new specification for nodular iron, A 339-51 T, has been developed by the subcommittee on nodular iron of ASTM Committee A-3 on Cast Iron. It subordinates chemical composition to physical properties, but the quantities of any chemical elements in the iron may be specified by agreement between manufacturer and purchaser. Two grades of material are covered—80-60-03 and 60-45-10, those figures representing tensile strength, yield strength and minimum elongation in 2 inches, respectively. The society also has revised specifications B 80-49T on magnesium-base alloy sand castings, and B 199-49T on magnesium-base alloy permanent mold castings to bring temper designations into agreement with current commercial practice.

State University of Iowa Management Course

College of Engineering, State University of Iowa, will hold its 13th summer management course June 9-21, in Iowa City. It is an intensive course covering production planning, job evaluation, motion and time study, wage incentives, plant layout, quality control, supervisory training, labor relations and legislation, organization and policy, and public speaking.

The regular university teaching staff will be augmented by outstanding men from a variety of industries and other educational institutions. Communications concerning the course should be sent to Wayne Deegan, 113 Engineering Bldg., State University of Iowa, Iowa City, Iowa.

TENTATIVE SPECIFICATIONS FOR NODULAR IRON CASTINGS

ASTM Designation: A 339—51T

Issued, 1951

Scope

1. These specifications cover castings made of nodular iron, also known as spheroidal or ductile iron, which is defined as cast iron with the graphite substantially in spherical shape and substantially free of flake graphite.

Process

2. The iron shall be made by any suitable melting process.

Tensile Properties

3. (a) The iron as represented by the test specimens shall conform to the requirements as to tensile properties prescribed in Table I.

(b) The yield strength prescribed in Table I shall be determined as the stress which produces a permanent set of 0.2 per cent of the initial gage length of the specimen and shall be reported. The "offset method" of determining yield strength as described in the Tentative Methods of Tension Testing of Metallic Materials (ASTM Designation: E 8) shall be followed, except that by agreement between the manufacturer and the purchaser the "extension under load method" may be used, or in the case of as-cast materials, the use of dividers is permissible.

Table I—Tensile Requirements

	Grade 80-60-03	Grade 60-45-10
Tensile strength, min, psi	80,000	60,000
Yield strength, min, psi	60,000	45,000
Elongation in 2 in., min, per cent	3.0[a]	10

[a] Where strength is the prime requirement the elongation requirement in grade 80-60-03 may be waived by agreement between the manufacturer and the purchaser.

Table II—Equivalent Shapes Corresponding to "Y" Blocks

"Y" Block Size, in.	Infinite Plate Thickness, in.	Round Diam., in.	Cube Edge, in.
½	0.5	1.2	1.75
1	0.9	1.75	2.75
3	1.6	3.1	4.8

Test Coupons

4. (a) The separately cast test coupons from which the tension test specimens are to be machined shall be cast to the size and shape shown in Fig. 1. The size of coupon cast to represent the casting shall be at the option of the purchaser. In case no option is expressed, the manufacturer shall make the choice. The test coupons shall be cast in open molds made of suitable core sand with a minimum of 1½ in. of sand for the ½-in. and 1-in. sizes, and 3 in. of sand for the 3-in. section. The coupons shall be left in the mold until black.

(b) By agreement between the manufacturer and the purchaser the 1-in. keel block shown in Fig. 2 may be used.

(c) It is recommended that the test coupons be cast immediately after the castings are poured.

(d) Test coupons shall be heat-treated with the castings where heat treatment is called for.

Tension Test Specimens

5. The standard round tension test specimen with a 2-in. gage length shown in Fig. 3 shall be used, except when the ½-in. "Y" block coupon is used. In this case, either of the test specimens shown in Fig. 4 shall be satisfactory.

Number of Tests

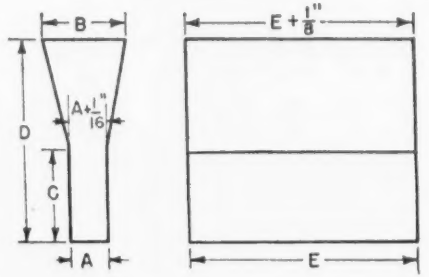
6. (a) The number of test coupons cast shall be agreed upon by the manufacturer and the purchaser.

(b) One tension test shall be made from sections cut from the test coupon as shown in Fig. 5. If any tension test specimen shows obvious defects, another may be cut from the same test coupon or from another test coupon representing the same metal.

Heat Treatment

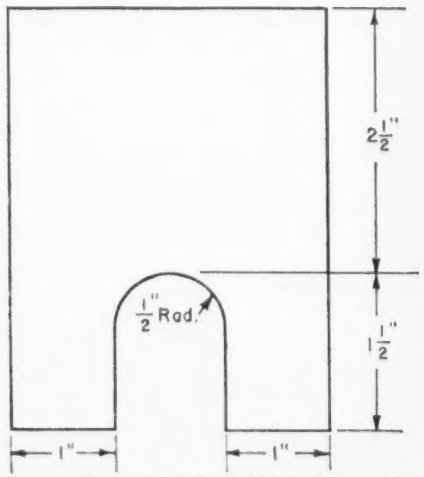
7. (a) It is intended that the physical properties of grade 60-45-10 be obtained by a graphitizing anneal; however, by agreement between the manufacturer and the purchaser, castings are acceptable if the physical properties are attained without heat treatment.

(b) The heat-treating cycle shall be chosen by the manufacturer.



Dimensions, in.	"Y"-block size ½-in.	1-in.	3-in.
A	1/2	1	3
B	1 9/16	2 1/16	5
C	3/4	1 1/2	2 5/8
D	5 3/8	5 3/8	5 3/8
E	6	6	6

Fig. 1 — Y-blocks for test coupons.



NOTE.—The length of the keel block shall be 6 in.

Fig. 2 — Keel block for test coupons

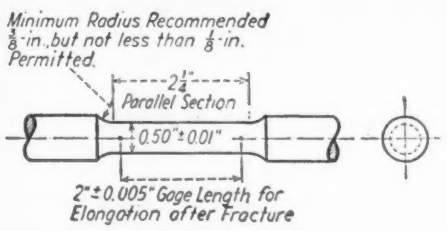
TENTATIVE SPECIFICATIONS FOR NODULAR IRON CASTINGS

ASTM Designation: A 339—51T

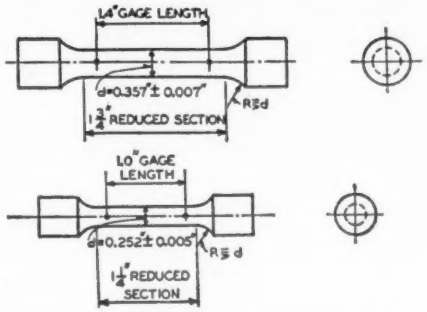
Issued, 1951

Chemical Composition

8. It is the intent of these specifications to subordinate chemical composition to physical properties; however, the quantities of any chemical elements in the iron may be specified by agreement between the manufacturer and the purchaser.



NOTE.—The gage length and fillets shall be as shown, but the ends may be of any shape to fit the holders of the testing machine in such a way that the load shall be axial. The reduced section shall have a gradual taper from the ends toward the center, with the ends 0.003 to 0.005 in. larger in diameter than the center.



NOTE.—If desired, the length of the reduced section may be increased to accomodate an extensometer.

Fig. 3—Standard round tension test specimen with 2-in. gage length. Fig. 4—Examples of small-size specimens proportional to standard ½-in. round specimen

Workmanship and Finish

9. The castings shall conform substantially to the dimensions on the drawings furnished by the purchaser, or if no drawing has been provided, to the dimensions predicated by the pattern supplied by the purchaser. The castings shall be free from injurious defects. Surfaces of the casting shall be free of burned-in sand and shall be reasonably smooth. Runners, risers, fins, and other useless cast-on pieces shall be removed. In other respects the castings shall conform to whatever points may be specially agreed upon between the manufacturer and the purchaser.

Inspection

10. The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, without charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. Unless otherwise specified all tests and inspection shall be made at the place of manufacture prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

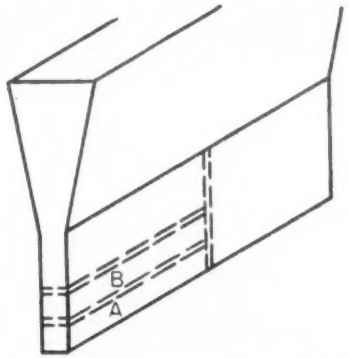
Certification

11. Upon the request of the purchaser, the manufacturer shall be prepared to certify that his product conforms to the requirements of these specifications.

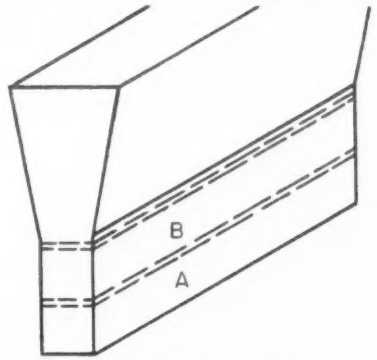
APPENDIX

As a general guide for selection of the proper "Y" block, the tabulation in Table II, based on cooling rates, shows, for various test coupons, the equivalent geometric shapes with various dimensions.

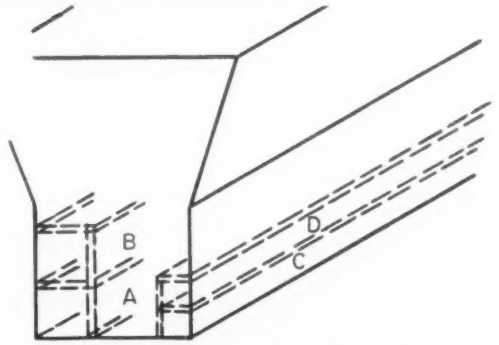
Additional copies of this specification may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, for a nominal sum.



(*a*) *½-in. "Y" Block.*—Two blanks for 0.252-in. diameter tension test specimens.



(*b*) *1-in. "Y" Block.*—Two blanks for 0.50-in. diameter tension test specimens or transverse tests.



(*c*) *3-in. "Y" Block.*—Two blanks for 0.50-in. diameter tension test specimens and two blanks for transverse test.

Fig. 5—Sectioning procedure for Y-blocks

Work Simplification

(*Continued from page* 103)

page of this article.

In following these steps, various well known principles, formulated by the pioneers of industrial engineering and proven over the years, must be applied. These principles are listed below. Check each job against the list to see what changes may be made, to improve the method and reduce the fatigue, in your search for the "one best way."

1. Begin each element simultaneously with both hands.
2. End each element simultaneously with both hands.
3. Use simultaneous arm motions, in opposite and symmetrical directions.
4. Use hand motions of lowest classification for satisfactory operation.
5. Motion path must stay within normal working area.
6. Avoid sharp changes of direction by planning a continuous curved motion path.
7. Slide small objects instead of pick up and carry.
8. Locate materials and tools in proper sequence, at fixed work stations.
9. Fewest elements usually mean shortest time.
10. Rhythm and automaticity lessen fatigue and increase output.
11. Foot pedals should relieve hands where possible.
12. Avoid holding. Use vise or fixture, freeing hands to move pieces.
13. Provide ejectors, foot-operated, to remove finished pieces.
14. Drop delivery should be used where possible.
15. Bring work close to point of use by gravity feed hoppers to shorten transport.
16. Preposition tools for quick grasp.
17. Preposition product for next operation.
18. Locate machine controls for ease of operation.
19. Design workplace height for sitting - standing arrangement, and provide proper height chair with comfortable seat and back rest for good posture.
20. Provide pleasant working conditions, considering: Illumination, temperature, humidity, dust, fumes, ventilation, noise level, color scheme, orderliness, etc.

In checking each job, do it not as a whole, but in its detail, taking only one element in the job at a time.

To follow the five fundamental

(*Concluded on page* 208)

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FOUNDRY Data Sheet April 1952

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These two important facts are worth remembering. They are two of the main reasons why KORWELD is not simply another core paste. KORWELD actually welds core seams by its ability to penetrate deeply into the core and around the sand particles. Instead of forming merely a surface weld, it grips into the actual grain, giving greater strength. KORWELD dries faster and gives a greater tensile strength than ordinary core paste. This eliminates a great part of "waiting time", which is a special advantage in production work. KORWELD is a scientific blending of materials which greatly increases resistance to moisture, a factor that gives added strength and safety in core storage. It reduces the possibility of cores slipping or falling apart in the moist atmosphere of the mold cavity. KORWELD helps eliminate trouble from gas formation. It is often used as a daub. You can't join the list of satisfied users, of course, until you try KORWELD. And until you try KORWELD, you can't let this amazing core paste prove its wonders. Why not take a tip from our Professor of Foundryology, and order a trial barrel today?

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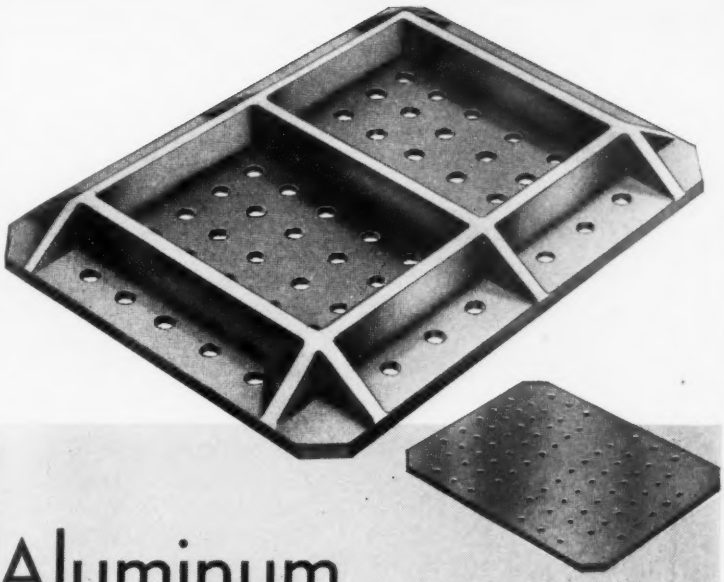

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(*Concluded from page* 205)

steps to job improvement, to apply the principles of motion economy, and to focus the questioning attitude on each element in a job in a methodical manner, the work-sheets reproduced here are used.

Fig. 1 is a simplified type of flow chart on which the job may be analyzed. An explanation of the symbols used in this flow chart is presented on page 101.

Fig. 2, the flow chart summary sheet, which is used to do the selling job on the proposed method, is really the meat of the program. It is senseless to spend time and effort analyzing a job and working up an improved method, if a slipshod and half-hearted attempt to present the possible savings and advantages to be gained, dooms the acceptance of the proposed method in the first place.

Remember, when you open the boss' pocketbook to put something in it (which is probably unusual these days) you'll be touching a soft spot which will make him look favorably on your ideas.

Fig. 3 is a job analysis worksheet for simplifying the questioning of every element, and jotting down pertinent notes, ideas and questions as they occur.

Figs. 4 and 5 are another type of worksheet for focusing the questioning attiude on the job, with space also afforded for making notes.

No program of training in work simplification will be successful if it is not worked at. Merely giving a man a book or an article on the subject and have him read it is a waste of time. Each man in any training program must be required to go through the five steps.

After the introductory meeting in which the subject is thoroughly explained, each man is given sufficient forms, told to select a project and actually go through all the steps. Subsequent sessions can be devoted almost entirely to discussions of each man's project in turn. The worth of the new ideas resulting from such a program and the possible savings on all of the projects submitted—if the program is conducted conscientiously—should be proof enough to all of the worthwhileness of work simplification.

Do Not Expect Miracles

Further, merely to go through a training program once—and then expect miracles in the way of new methods and savings to continue to flow from the group is plain wishful thinking. If the benefits of work simplification are to be fully realized, and continue to be realized, a definite follow-up program should be initiated and religiously adhered to.

One man should be made responsible for the follow-up program. Meetings should be held periodically (about once every two months), and each man should be required to submit a new project at each meeting for discussion and ultimate approval.

A record should also be kept of the projects submitted, the possible savings, those approved and put into effect with the realized savings, and last, but not least, the reasons for each project not approved should be adequately explained to its author and written up in the record for future reference.

Such a record, which should be submitted to top management periodically, will prove that a work simplification program, when properly conducted, pays off. This will make it progressively easier for the group to sell its ideas to top management, even when it means some capital outlay for equipment or a change in physical layout.

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Little wonder, then, that they have enjoyed such wide acceptance for over 40 years!

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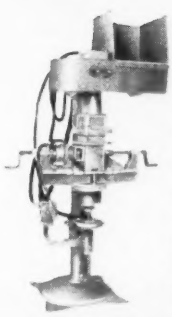

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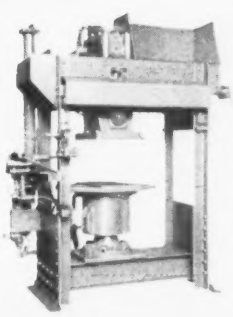

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Blowholes in Castings

By PAT DWYER, *Engineering Editor, FOUNDRY*

SOME recent discussion on the subject of blowholes in castings suggested the resurrection of the following comment by the late Enrique Touceda, noted foundry authority and technical consultant to the Malleable Founders' Society:

"One of the most common defects found in gray iron castings is the blowhole. Of all casting troubles this is the one of which the foreman always seems to know the cause. When he believes damp sand is not the cause, he is positive it is due to inefficient venting. In many instances that have come to my attention I have been convinced that the blowholes shown me were occasioned by dull metal, and not at all by either damp sand or lack of venting. While this view is not presented as anything new, mention is made of the fact, because the foundryman invariably seems loath to consider this as a possible cause of trouble; particularly if the metal from the cupola spout has been very hot. He fails to realize that it is possible to obtain sizzling hot metal from the spout, and at the same time, due to some delay, a particular mold, or perhaps all the molds on a distant floor, may have been poured with dull iron.

"Another cause, and one that may be new to some foundrymen, has been found to be due to the use of core or molding sand contaminated with particles of sea shells. These shells are composed of carbonate of lime which, if heated to about 1470° F, will liberate carbon dioxide gas. Moisture, on the contrary, is converted into steam at the comparatively low temperature of 212° F."

When either extremely hot or dull molten metal strikes the sand, steam is generated immediately. Steam will escape readily from the mold if the sand is open and the venting is good. However, whether the iron is hot or cold, some steam will be caught in the metal as it passes through the mold cavity. When the iron is extremely hot and fluid, the expansive force of the steam is sufficient to enable it to force itself out of the molten metal before the metal begins to solidify against the sand.

If the metal is dull, a thin shell of solid iron will form against the sand so rapidly that bubbles of trapped steam cannot force a passage. As a natural result blowholes will be formed in the casting.

This situation is much more serious when the sand is contaminated with carbonate of lime. As already indicated, carbon dioxide gas is not liberated from carbonate until the temperature has been raised to 1470° F. This implies that no matter how hot the metal entered the mold, it is considerably cooler at the instant the gas is liberated. Therefore, the gas never has the opportunity to escape when trapped, as in the case of steam. Consequently, the chances are that blowholes will be found in the castings when carbonates are present in the sand, no matter how hot the metal is when poured. These blowholes invariably will be found just under the skin. For obvious reasons it is equally important that all mold facing materials be free from carbonates of any kind.

Hints for Patternmaker

MARKING and recording patterns, coreboxes, strikes, matchplates, etc., is a job that should not be entrusted to a careless workman. Neither should the location of the patterns in the pattern storage be known to only one man irrespective of whether he has a phenomenal memory or not.

The fact that one employee can go into the pattern vault blindfolded and lay his hands on any given pattern is of little help if some day he should happen to be absent and a certain pattern or a number of patterns are wanted in a hurry. On an occasion of this kind it is not uncommon for the foundryman to go into the vault to search for the pattern or patterns. After examining three or four approximately alike he decides that a certain one is the one he wants. Then he is not sure whether there is a special corebox or if a stock core was used the last time the job was in the foundry.

Patterns should be marked in a legible manner and according to a definite system, with every part listed and location accounted for. There should be a definite location, indicated by floor, section and shelf for each pattern. All this information should be on record, either in book form or loose leaf filing cabinet, so that any employee, anytime can walk into the pattern storage and find any required pattern.

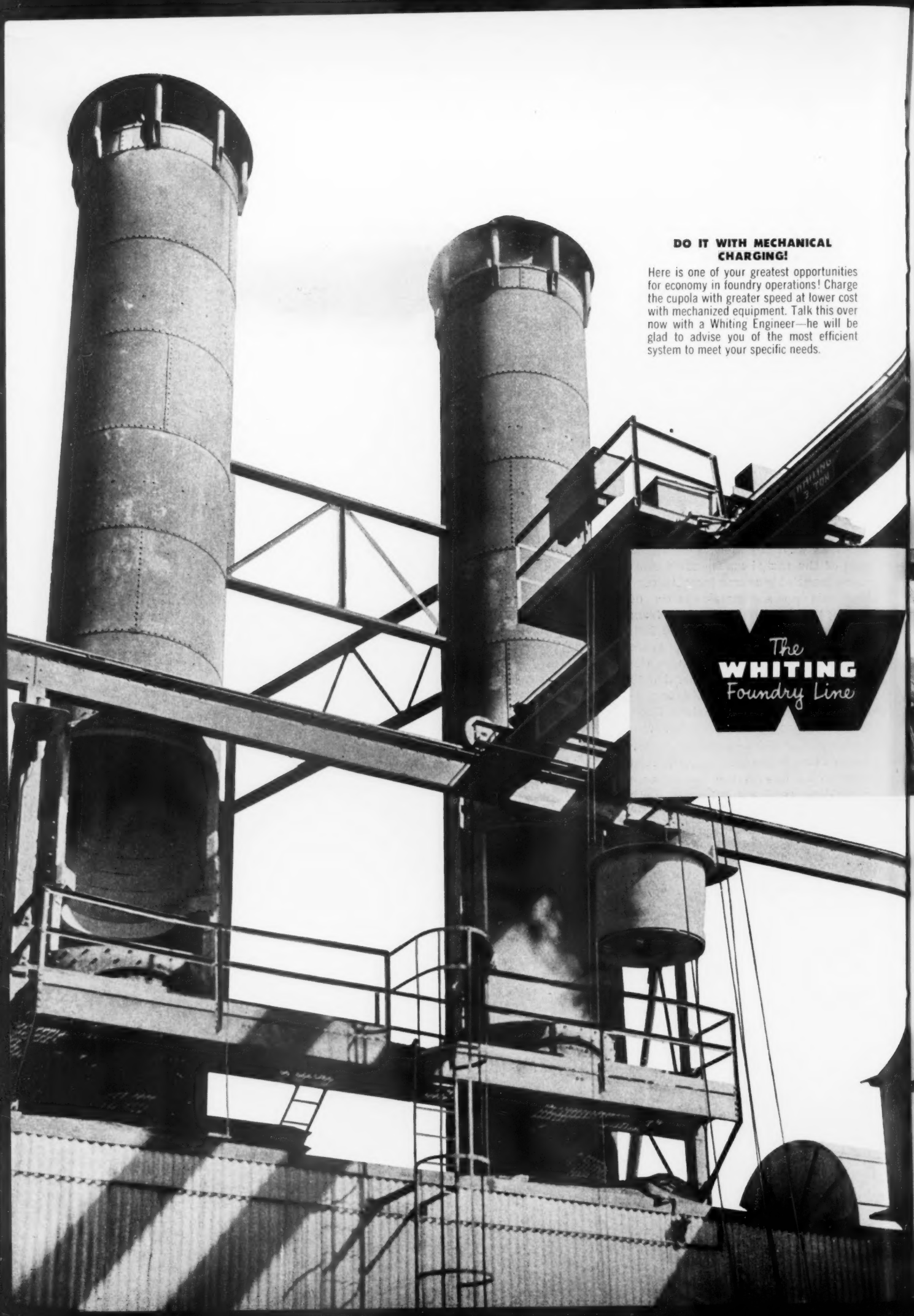
Leave no room for guesswork. Use letters and figures of such a size that they are not only legible on the pattern but also will appear legibly on the casting. Frequently the latter point is given no consideration. The identifying letters and figures are placed on a part of the pattern where they effectually are concealed when the casting takes its place in a general assembly. Importance of clearly and intelligently marking and recording patterns is illustrated by the following examples:

A casting known as a combination gear and pitman wheel on a certain machine was broken. A new casting was ordered from the plant where the machine had been built. The casting had been made from an altered pattern marked 100 *A*. The original pattern had been designed and marked 100. In placing the *A* on the altered pattern the patternmaker used a ⅜-in. letter instead of the ½-in. letter to correspond with the figures. The small figure was quite legible on the pattern, but its identity was lost on the casting and it appeared simply as a small lump. The result was that instead of ordering a casting marked 100 *A*, the order simply specified pattern No. 100. The mistake was not discovered until the machine had been taken apart and attempt made to introduce the new casting. Usually the molder does not take time to patch letters or figures in a mold. In fact, no one pays any attention to them until after a mistake has been made in the foundry, and discovered later by the customer.

Exception to this general rule may be observed among the makers of electrical equipment. Almost without exception on this class of castings, identifying letters and figures are placed on the patterns in such a manner that they readily are apparent after a machine has been assembled.

Two bevel gears were needed to replace a pair that practically were worn out. The millwright was in-

(*Continued on page* 214)



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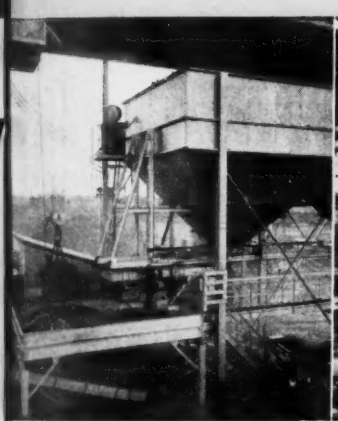

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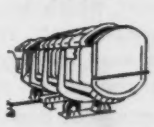
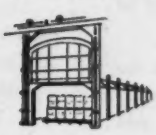
Dust Supressors

Cradle Furnaces



Annealing Ovens

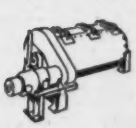


Cupolas

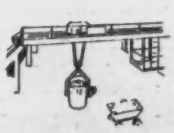
And look into these Whiting products too!

Pulverizers

Ladles



Tumblers



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(*Continued from page* 211)

structed to place the order for new gears in time to have the new pair on hand, ready to be installed before beginning to dismantle the old set. When the millwright attempted to secure the pattern number on the gears he found that it was cast on the inside of one arm and completely out of sight. To get the necessary information he had to remove the gears from the shaft and then replace them pending the arrival of the new castings.

In the first instance the fault clearly was the patternmaker's. He should have known that a small letter would not show up on a rough casting. In the second instance the fault lay either with the drafting office or the pattern shop office. The patternmaker fastened the letters on what was designed as the drag side of the pattern. This was strictly in line with usual pattern shop practice. The patternmaker, lacking specific instruction, was in no position to know what position the casting was to assume in the final installation. That point should have been taken care of and a note placed on the working drawing directing the patternmaker's attention to the fact that the pattern letters should be attached to a certain well defined space, where they would be visible when the casting eventually was placed in service.

Sand Needs Attention

DESPITE the fact that the grade or quality of the sand employed in a foundry is one of the most important factors entering into the cost of castings production, in many cases this feature is given little or no consideration. That the material listed as molding sand or core sand as the case may be, and that it may be purchased at a favorable figure, too often are the only considerations that have any weight.

The manner in which it is prepared for the use of the molders also is important. While this phase of the question undoubtedly has received and is receiving more consideration than formerly, still in many instances there is room for improvement.

If the molders are accustomed to preparing their own sand, and if they are familiar with its characteristics, fairly satisfactory results are attained even with sand not particularly suited to the work in hand. However, the results will be still more gratifying if a proper grade of sand always is employed.

In plants where, for the most part, men have been broken in as molders after a short course in intensive training and where the sand is prepared in bulk and distributed by men who are not immediately concerned with its ultimate fitness or unfitness, the problem is entirely different. Individual judgment on the molder's part on the condition of the sand, is neither expected or invited. He uses the sand supplied to him. If on piece work, he accepts his discount on bad castings as something over which he has no control. The problem of furnishing satisfactory sand clearly is up to the man in charge of operations.

Percentage of bonding material and the relative size of the sand grains determine to an approximate degree the classification of molding sands. The clay content has an important bearing on the fusibility, bonding strength and permeability. Grain size determines whether the sand is suitable for certain classes of castings. A series of laboratory tests may give the chemical analysis, the

(*Concluded on page* 217)

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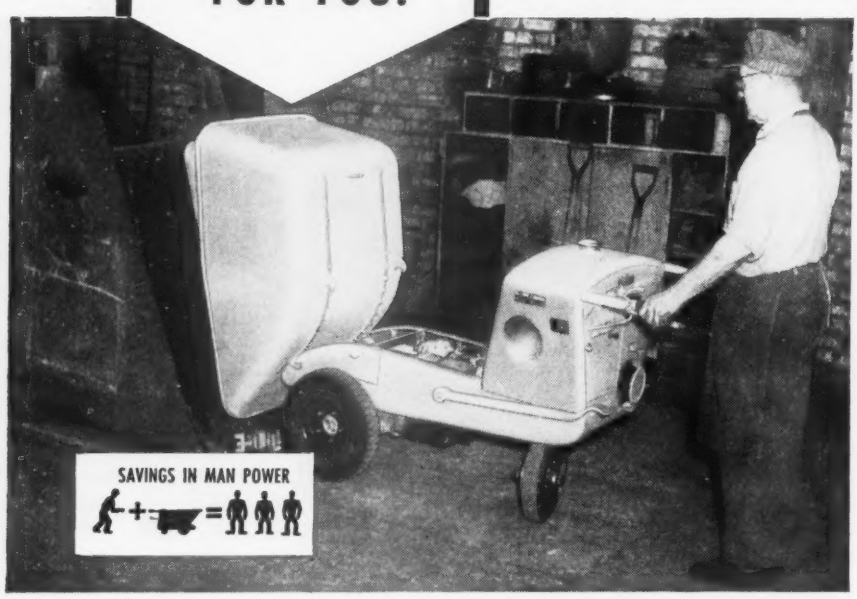
Operator has positioned the powered Prime-Mover at Wheelabrator hopper without pushing or pulling. Foot pressure on pedal dumps bucket which then returns to load position automatically.



PRIME-MOVER speeds production for you!

It is good fortune when a single piece of equipment performs so many jobs well—as prime-Mover does in a foundry. This fact has placed foundries at the top of our list among satisfied Prime-Mover owners. Foundry men say that Prime-Mover returns the investment within 60 days.

The ten cu. ft. bucket handles all kinds of bulk materials—castings—sand—coke—coal—scrap—knockout. The platform handles heavy flasks, cores, and large castings.

Dependable 5 H.P. air-cooled Wisconsin engine powers the Prime-Mover forward and reverse. Protected from foundry dust and dirt. Runs all day on a tankful of gasoline.

Prime-Mover supplies the capacity and the power to save the time and the wages of three men—often more. Anyway you add it up—Prime-Mover multiplies manpower. Your request for additional helpful data will be promptly filled.

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Western saddles are noted for their intricate tooling and beautiful Sterling silver trim. Cattlemen pay a big premium for this kind of craftsmanship . . . a premium that pays no dividends in the practical sense. BUT . . . the small premium you may pay for the fine craftsmanship in a Buffalo Pattern, starts paying dividends the minute the equipment is installed in your foundry.

Yes, it may take a few more man hours, it takes a little more skill, a little more patience and a LOT of that old-fashioned "pride in a job well done" attitude to produce a Buffalo Pattern. But . . . it's all well worth it! That's why smart pattern buyers have, for over half a century, looked to Buffalo for the equipments that ALWAYS insure the complete success of any important casting job.

Buffalo Patterns actually COST YOU LESS because they are intelligently planned and painstakingly produced to *precisely* fit your foundry and your production schedules. You have no adapting or *extra* rigging and your scrap ratio is held to a minimum. If you'd like to see bigger profits, better performance and smoother production . . . call in one of our pattern engineers on your next important pattern making job.

FOR INSTANCE — This large magnesium casting for one of the latest jet aircraft engines presented hundreds of complex metallurgical, foundry and pattern engineering problems. It was our job to design and build a pattern to produce this casting. Although the customer's foundry was located over 300 miles from our plant, we worked closely with them in both the planning and construction stages of the job, anticipating and then solving these inherent foundry problems. Our engineers followed up the pattern equipment after delivery to expedite the sample castings and are now seeing it successfully into production.

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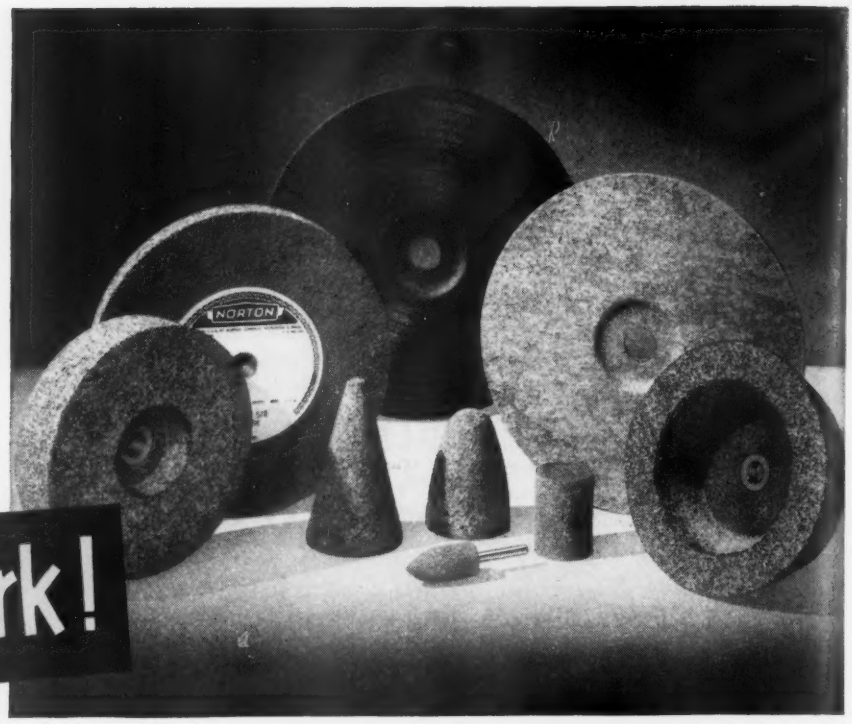

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Ask your nearby Norton distributor about new, improved Norton portable grinding wheels. He's listed under "Grinding Wheels" in your classified telephone directory. Or write direct to Norton Company, Worcester 6, Mass. Distributors in all principal cities EXPORT: Norton Behr-Manning Overseas Inc., Worcester, Mass., New Rochelle, N. Y.

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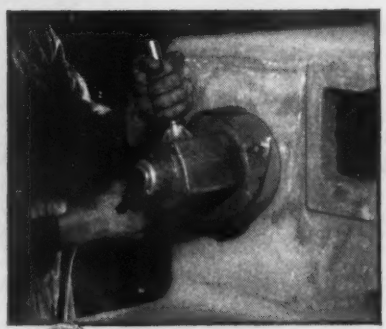
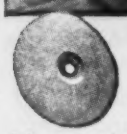
GRINDING A STEEL CASTING preparatory to machining is one of many jobs done best by Norton straight wheels. No other wheels *hug that work* so closely...remove so much metal per man-hour...last so long.



SURFACING A MACHINE BASE is typical of the tough jobs Norton cup wheels make easy. Fast-cutting and long-lasting, they do an extremely efficient job with a minimum of operator fatigue.



SMOOTHING DOWN WELDS is a quick, easy, safe job with both types of Norton REINFORCED Hub Wheels — the rigid BD and the flexible BFR. Made with a special resinoid-bond and layers of fabric reinforcement, they give you fast grinding, long wheel life, and maximum safety.

NORTON ABRASIVES

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(*Concluded from page* 214)

size and shape of the grains and the percentage that will pass through a certain size screen. These data furnish a valuable index on which to base specifications for subsequent shipments.

Unfortunately, the great majority of foundries are not equipped to conduct elaborate laboratory experiments. Extended research inaugurated by the American Foundrymen's Society in the early 20's and pursued vigorously up to the present, with wide dissemination of the information through the technical press, have made the foundry industry as a whole sand conscious.

Status of the molding sand situation in the foundry industry is comparable to some extent to the prevalent views on the melting and mixing of metals current in the early years of the present century. Common sense and experience played an important part in selecting the iron in those days. Although the old time foundryman could not list the percentage of the component parts of a casting, he could and did make a satisfactory product.

While an accurate and scientific knowledge of sand properties in its application to the foundry is desirable, and eventually will be as common among foundrymen as analysis of metal has come to be, in the meantime an application of common sense must be depended upon to eliminate a great deal of the loss due to unsuitable sand, or to sand improperly prepared on the foundry floor, or used without proper inspection.

Book Review

Tool Steel Handbook, cloth, 197 pages, 7¼ x 10½ in., published by Allegheny Ludlum Steel Corp., Pittsburgh.

This handbook contains charts and tables giving specific and comparative data on properties, analyses and applications of tool steels. Descriptions are included for all important grades, arranged alphabetically for easy reference. Later chapters deal with the many forms and finishes of tool and die steels and such allied products as the sintered carbides. Final sections are comprised of extensive discussions of heat treating and handling techniques as applied to tool and high speed steels and a complete set of weight tables and other useful reference material.

Free copies of the volume will be sent to qualified persons on request to Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22.

Basic Cupola Irons

(*Continued from page* 87)

daily tensile test results on Class 30, 35 and 40 irons for the 12-day period of basic operation compared with the daily tests of the preceding and following periods with acid practice is shown in Fig. 3.

It first appeared that the low sulphur obtained in the basic irons resulted in sub-specification properties. To check this the tensile strength values for the various irons were plotted against their respective carbon equivalents with point indications of sulphur level. The carbon equivalent was taken as per cent total carbon plus the sum of one-third the per cent silicon plus one-third the per cent phosphorus. The plot obtained is shown in Fig. 1 and shows clearly that the tensile strength of these irons is a function of the carbon equivalent and that sulphur content in these ranges has no significant effect.

Having established the relationship between carbon equivalent and

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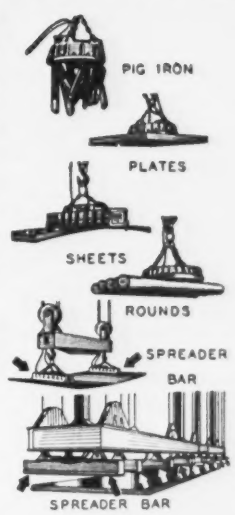

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tensile strength for the basic irons, the question of a similar relationship for inoculated acid-melted irons logically arose. This plot is shown in Fig. 2 on which the same limit lines used in Fig. 1 have been drawn.

It will be noted that the strength values fall generally within the same range as the basic irons.

An exhaustive study of the relationship between strength and analysis of uninoculated irons has been made by Schneidewind and McElwee.[1] As a matter of interest, their average line having the equation $T/10000 = 11.5 - 2\ CE$ where T = tensile strength in pounds per square inch and CE = carbon equivalent ($C + Si/3 + P/4$) is also shown in Fig. 2. The range obtained on the irons in the present series is somewhat higher than this average value, especially at the higher strength levels. This would be the normal expectation of the inoculation practice.

The higher carbon levels usually associated with basic operation may be the indirect result of the low sulphurs obtained. The important fact is that the tensile strength was lower because of the higher total carbons. As in acid operation, basic-melted irons can be produced within specified tensile ranges through control of the carbon equivalent.

Reference

1. R. Schneidewind and R. G. McElwee, "Composition and Properties of Gray Iron," *Transactions*, AFS, vol. 58 (1950).

Book Review

1951 *Supplement to Book of ASTM Standards*, Part 1 Ferrous Metals, paper, 401 pages, 6 x 9 inches, published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $3.50.

Contains the extensively revised standards and the new and revised tentatives in ferrous metals, which have been accepted since the appearance of the 1950 *Supplement*. Three standards replace existing standards, and of 54 tentatives, 23 replace existing tentatives, 25 are standards which have been revised and reverted to tentatives, and 6 are published for the first time. The book also contains yellow stickers for affixment in the 1949 *Book of Standards* and the 1950 *Supplement* to direct attention to changes, and a number of emergency alternate provisions which have been included.

Of particular interest to the foundry industry are: A278-51T, "Gray Iron Castings for Pressure-containing Parts for Temperatures up to 650 F"; A338-51T, "Malleable Iron Flanges, Pipe Fittings, and Valve Parts for Railroad, Marine and Other Heavy Duty Service," and A339-51T, "Nodular Iron Castings."

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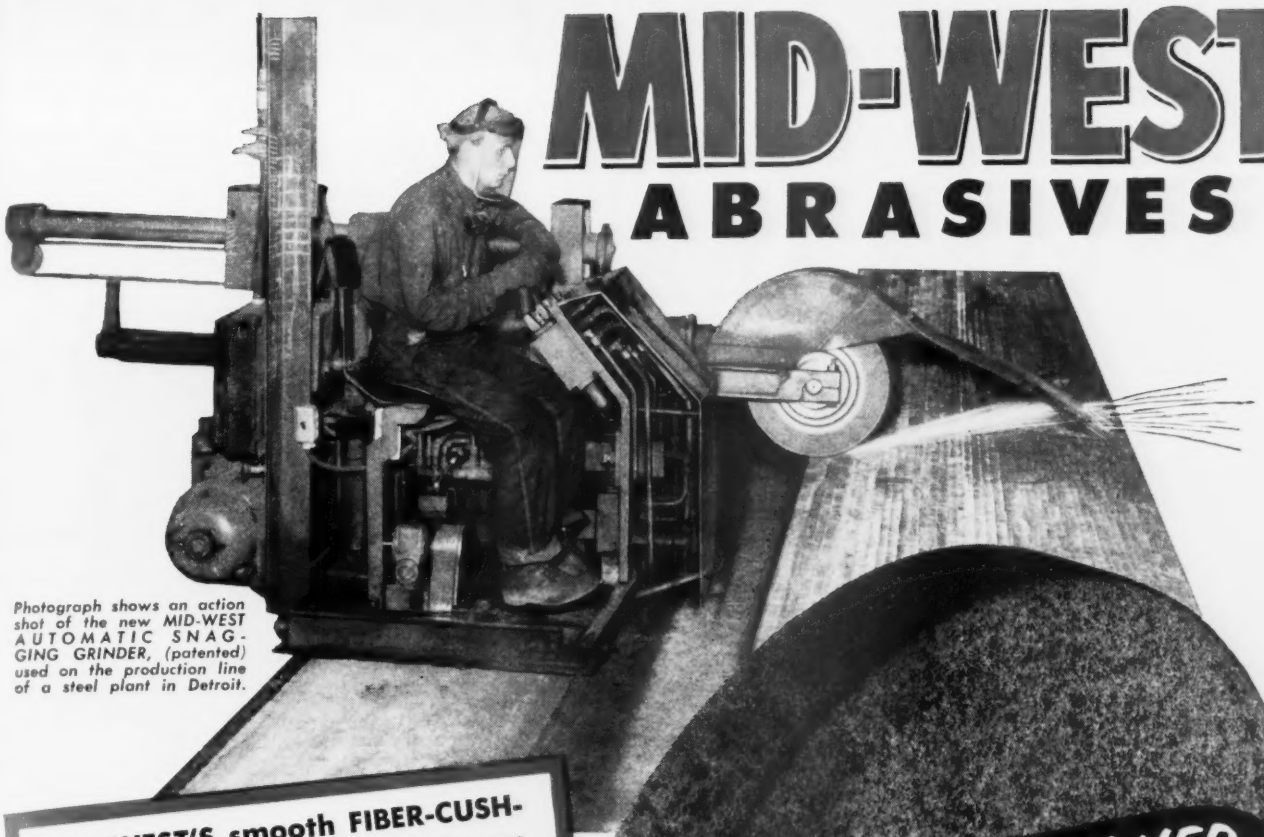

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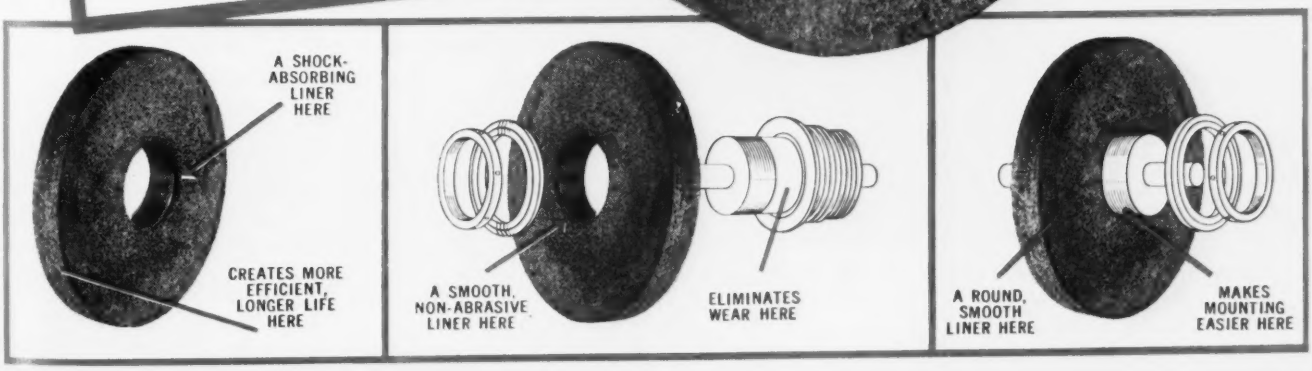
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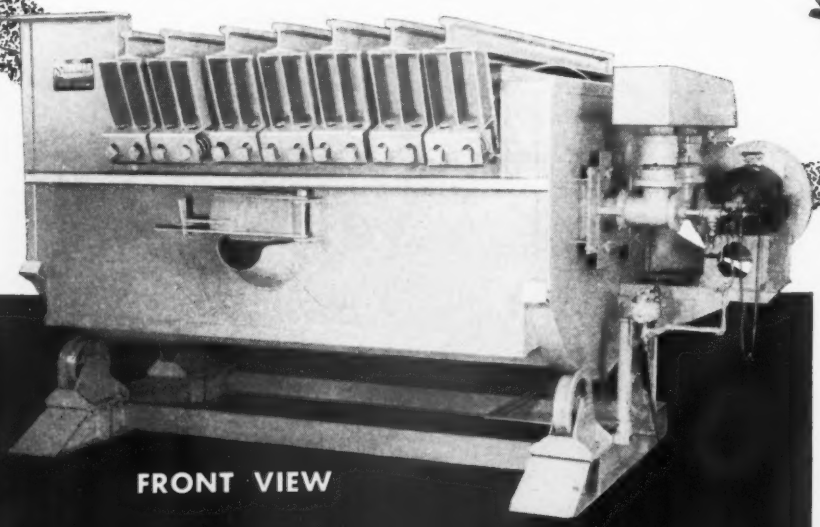
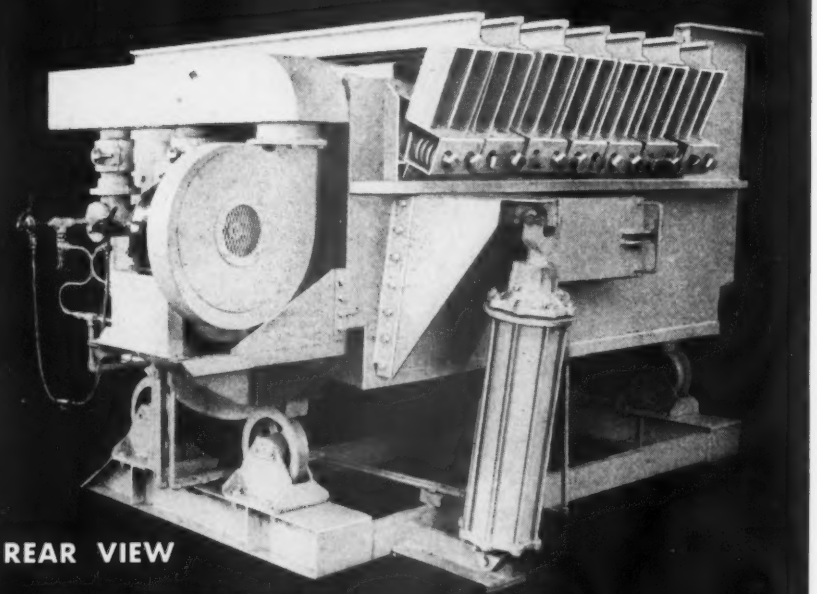
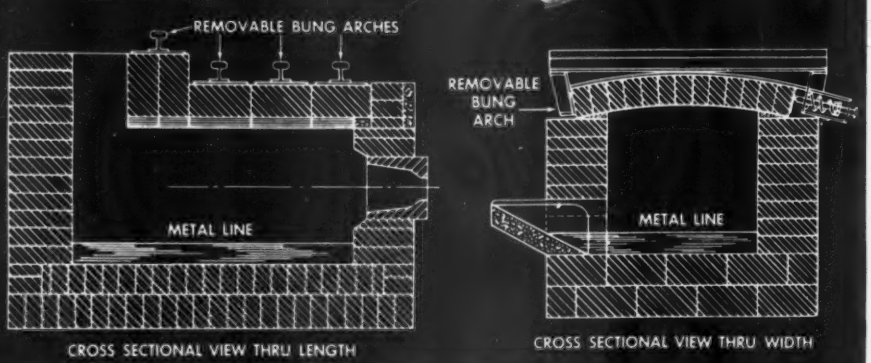


FRONT VIEW



REAR VIEW



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CROSS SECTIONAL VIEW THRU WIDTH

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Wisconsin Conference Technical Reports

CONCLUDING reports on papers presented at technical sessions of the recent Wisconsin Regional Foundry Conference in Milwaukee are given here. Other conference papers were discussed in the March issue.

THE most animated session of the Wisconsin Regional Foundry Conference was the fourth and concluding meeting on gray iron at which Harry E. Gravlin, assistant manager of foundry, Ford Motor Co., Dearborn, Mich., conducted a forum on "Sand, Metal or Men?" Chairman was L. J. Woehlke, Spring City Division, Grede Foundries Inc., Milwaukee, and L. B. Koenig, J. I. Case Co., Racine, Wis., was co-chairman.

Mr. Gravlin set the stage by stating that sand, metal or men constitute three reasons for castings to be faulty. He then announced there had been submitted for examination and diagnosis several sectioned castings from 4 and 6-cylinder engine blocks with which three different foundries have experienced on an intermittent basis identical defects at certain points. Scrapped castings have run as high as 10 per cent. To aid in trouble-shooting the problem, the core assemblies for the engines also were displayed. Prior to the session, the speaker had not seen the castings nor an opportunity to study the job's production data.

After the audience had an opportunity to examine the castings and cores, Mr. Gravlin initiated, with audience participation, an exploration into possible causes of the defects.

Estimating that the audience represented 1500 years of foundry experience, the speaker asked if the defects observed were blows, shrinks or dendritic structure? Opinion varied, as would be expected. Among questions asked and debated as the conference proceeded were: Are the defects caused by gas? Where does gas come from? Cupola metal? Cores? Scrap in the charge? Are cores too tight? Are cores vented properly? Is it the way sand is mixed? Does sequence of mixing make a difference? Are molds gated correctly? Is casting design the trouble?

Time for the session expired before a full solution could be arrived at, but Mr. Gravlin had accomplished his mission of pointing the way in analyzing the problems of defects and determining what steps to take to eliminate them.

At the second gray iron session, J. Allen Wickett, Plastics Division, Monsanto Chemical Co., Springfield, Mass., discussed "Synthetic Resin Core Binders." C. W. Schwenn, Brillion Iron Works Inc., Brillion, Wis., presided, and E. Gruetzmacher, Universal Foundry Co., Oshkosh, Wis., was co-chairman.

Three types of such binders are in use: Phenol aldehyde, urea aldehyde and melamine aldehyde. All are thermosetting in that oxygen is not necessary for curing. According to the speaker, resin binders are not a coreroom panacea. If properly applied, they have real merit, but if improperly applied, are disappointing. They require good control, timed mixing cycle, dry rather than wet sand, and minimum times between making and baking of cores. Moisture maximum is 3 to 5 per cent, although a water spray just before baking gives good results.

Mr. Wickett discussed in detail ranges in composition of core mixes; sand preparation and handling; and coremaking, baking and storage. In mixes, resin ranges from 0.5 to 0.75 per cent by weight. Clays in excess of 0.33 do not give good results. Sand must be cool. Resins have an advantage in reducing baking cycles, the speaker pointed out. Savings of 40 to 50 per cent are common, and in some cases up to 75 per cent can be obtained.

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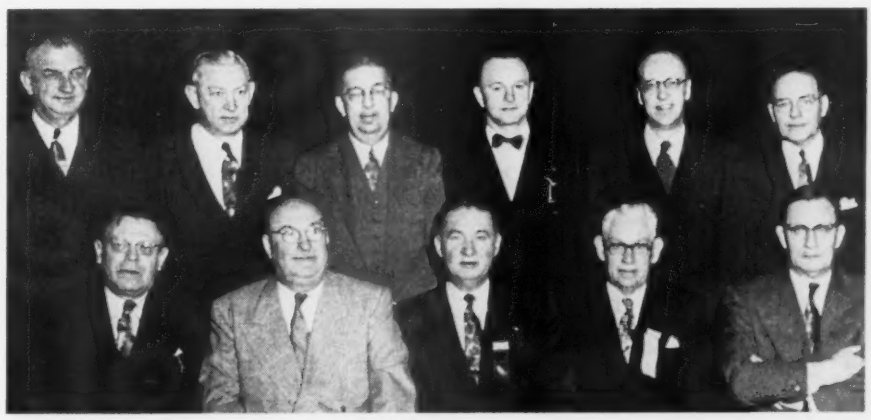

Past presidents of Wisconsin Chapter, present at the conference, were, front row, left to right: W. J. MacNeil; R. M. Jacobs; G. E. Tisdale, current president; R. C. Woodward, and Walter Gerlinger. Back row: H. E. Ladwig, B. D. Claffey, D. C. Zuege, G. K. Dreher, W. W. Edens, and R. J. Anderson

Frank Kirkpatrick, radio news commentator, (left) was the principal speaker at the Wisconsin Regional Foundry Conference banquet Feb. 7. In his talk, "Current Pourings from the Melting Pot," he extolled the virtues of the free enterprise economic system. At right, left to right, are: Dean M. O. Withey, College of Engineering, University of Wisconsin, who made the welcoming address, and George E. Tisdale, Zenith Foundry Co., chapter president. Conference photos by Walter V. Napp, Delta Oil Products Co.

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(*Continued from page* 221)

"Production and Uses of Foundry Sands" was discussed by Bradley H. Booth, foundry engineer, Carpenter Bros., Milwaukee, at the third gray iron session. Chairman was T. H. Tanner, Zenith Foundry Co., West Allis, Wis., and D. R. Hutchinson, Nash-Kelvinator Corp., Kenosha, Wis., was co-chairman.

The speaker covered a brief history of sands, including the types commonly used in the foundry. Then followed a discussion of the nature of various sand deposits and methods of processing them. Methods of shipping, unloading and handling sand in the foundry were outlined. Sand testing and control was described with emphasis on moisture, permeability, green compression strength, clay and grain fineness.

Mr. Booth used a number of slides to illustrate common casting defects that can be caused by sand, such as blows, hot tears, rat-tails, etc.

Those who attended the second pattern session heard I. C. Meyer, Delta Power Tool Division, Rockwell Mfg. Co., Milwaukee, discuss "Modern Pattern Shop Equipment." Al Fischer, Charles Jurack Pattern Works, Milwaukee, was chairman.

Pattern Shop Equipment

Mr. Meyer presented slides showing unusual applications of ordinary pattern shop equipment—band saws, circular saws, drill presses, planers and jointers. Much time can be saved by extending the use of equipment, and he used the pictures as illustrative examples. Additional savings result through use of small tools and taking the tools to the work instead of bringing the work to the tools. He also stressed the advantage of proper grouping of tools to avoid the necessity of workmen walking all over the shop to perform successive operations on a piece of work. Having several small pieces of similar equipment also prevents workmen standing in line to use one large machine.

In its third session, the pattern group heard Carl F. Haertel, foundry superintendent, Falk Corp., Milwaukee, discuss in a most interesting manner "Steel Casting Problems and How They Affect Production." Numerous slides added emphasis to the presentation. A. M. Fischer, Charles Jurack Co., Milwaukee, presided, and Harry Arneson, Spring City Pattern Works Inc., Waukesha, Wis., was co-chairman.

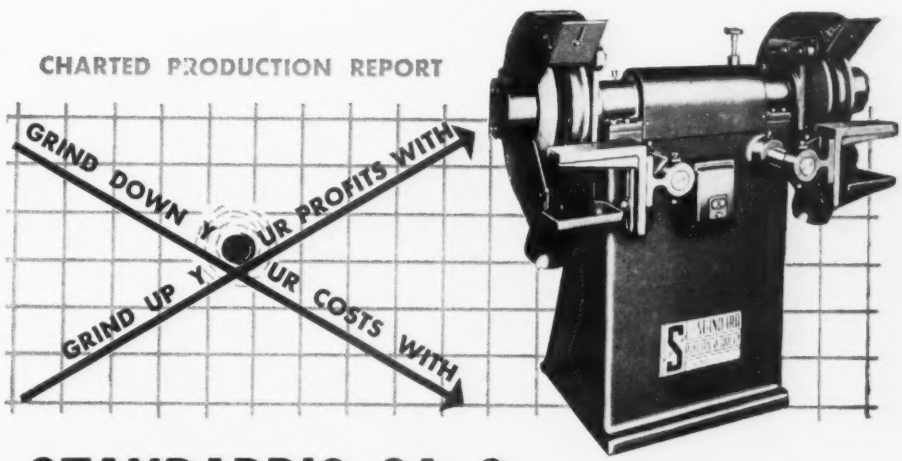
Under today's heavy demand for castings, Mr. Haertel said there might well be a program on "castings simplification," to enable faster production and better deliveries. Foundry mechanization will help to achieve this, but a good foundry engineer devoting full time to all phases of production, including product design, would help even more.

Falk Corp. embarked on a program of design simplification several years ago and it has worked out rather well. The new approach frequently results in changes in molding methods and different types of pattern equipment. For example, it may be desirable to go from loose patterns to mounting on rollover boards, or switching from dry sand to green sand molds.

Small runs may offer few possibilities for improving practice, but for production jobs a castings purchaser or the foundry can afford to spend money on redesign and the most efficient pattern equipment.

Steve Denkinger, Atlas Plastic & Aluminum Plate Co., Butler, Wis., spoke on "New Trends in Pressure Cast Equipment" at the concluding pattern session. Chairman was W. Kollmorgen, Kollmorgen Pattern Works.

Mr. Denkinger illustrated typical aluminum alloy matchplate and cope and drag patterns made in plaster



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molds under pressure. Also shown were plastic patterns and a few brass patterns.

The speaker discussed briefly a new sulphur compound which melts around 325°F and has no shrinkage or expansion. It is used for duplicating small master patterns when several are to be grouped to make the plaster mold from which an aluminum matchplate is made.

Porosity difficulties in pressure cast patterns were discussed with Mr. Denkinger remarking that new and improved materials used in the pressure cast duplication pattern process are fast reducing this defect.

M. E. Annich, superintendent of standards, American Brake Shoe Co., Mahwah, N. J., addressed the third steel meeting on "Work Simplification in the Foundry." Meeting chairman was R. V. Tetzlaff, Pelton Steel Co., Milwaukee, and C. J. Zilch, Bucyrus-Erie Co., Milwaukee, was co-chairman. A summary of Mr. Annich's discussion is presented elsewhere in this issue.

Final session on steel was devoted to factors which determine the performance of castings under severe service conditions. Chairmen were Prof. George J. Barker, University of Wisconsin, and David C. Zuege, Sivyer Steel Casting Co., Milwaukee. Speaker was William S. Pellini, U.S. Naval Research Laboratory, Washington, who pointed out that tensile properties offer little guidance in selecting materials for structures which operate under shock loading and low temperatures, and the factor of notch toughness has become the accepted criterion.

This is based on the fact that cast and forged steels of equivalent analysis give similar notched-specimen, temperature transition curves. Extremely severe tests involving structural scale explosion loading at low temperatures of castings, forgings and weldments demonstrated that performance was determined by notch toughness. Brittle fracture characteristics of castings and forgings are the same, provided equal notch toughness is indicated by the notch-bend specimen transition.

Additional explosion tests were made to determine the deformation which various materials develop prior to fracture, and it was found that, as the temperature is lowered, the level of deformation preceding fracture decreases. Class B steels, for example, are capable of withstanding drastic deformation to temperatures as low as minus 40°F and nodular irons to 0°F.

Oxygen Speeds Melting

Use of oxygen in the malleable foundry was discussed in a paper by L. H. DeWald and J. P. LaPota, both with National Cylinder Gas Co., Chicago, and presented by Mr. LaPota. H. C. Stone, Belle City Malleable Iron Co., Racine, Wis., and Carl Grobschmidt, Badger Malleable Co., South Milwaukee, Wis., were chairmen of the meeting. Tests not fully completed as yet indicate in malleable air-furnace melting, an accelerated melting rate, decrease in total fuel, increase in productivity, more positive control of metal bath, decrease in oxidation, and increase in slag and metal fluidity.

Use of oxygen in a powdered coal-fired annealing oven shows more rapid rate in reaching 1600°F. In the cupola oxygen provides hot metal immediately after the cupola is started, re-establishment of good operating conditions quickly after delay, improved metal fluidity, etc.

At the third malleable iron session R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis., discussed "The Mechanics of Foundry Mechanization." Chairman was Joseph Kropka, Chain Belt Co. Mr. Anderson cited the following reasons for

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Advantages of Paraspray

- Makes smoother castings and saves cleaning labor.
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- No baking — no torching.
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- Produces hard, dry, moisture - proof surfaces with uniform strength.
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- PARASPRAY provides complete moisture control. *A PARASPRAY* film on surface of core or mold, *PREVENTS MOISTURE* absorption or loss from molds in green sand work; especially where synthetic sands are used.
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Sand Mixer For thorough preparation of sample core-sand mixtures.

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mechanization: Reduction of labor and material costs, more production per unit area, and improved product quality.

He commented that any one piece of mechanized equipment is dependent upon all others in a system, and to avoid costly downtime, attention should be given to the small factors that might interfere with efficient operation of expensive equipment.

To operators of small foundries, who may not be able to afford large expenditures for extensive mechanization, he suggested work simplification and efficiency improvement studies to achieve increased quality and production. The use of inexpensive special fixtures and wider use of existing equipment might be helpful in achieving increased efficiency.

Sessions on malleable iron concluded with a discussion on why a preventive maintenance program should be established and how it can be accomplished. Speaker was Thomas F. Butler, Ford Motor Co., Dearborn, Mich., and the chairman Ralph Schaper, Wisconsin Appleton Co., South Milwaukee, Wis., and Martin Harder, Lakeside Malleable Castings Co., Racine, Wis. Mr. Butler stated that machines installed in a foundry have to pay for themselves; to do this they must be kept in good operation at all times through regular inspection. Hence, all equipment should be located so that it is accessible for inspection and replacement, and the maintenance man or men should be given adequate tools to do the job quickly and efficiently.

Duties of a maintenance department, according to Mr. Butler, include keeping buildings and grounds in clean sanitary condition; making emergency repairs; making routine repairs not of an emergency nature; inspecting equipment and machines to detect needed repair; scheduling repairs and renewals to make maximum use of manpower and minimize disturbances to operations; keeping records of costs, machines and equipment, and maintaining adequate repair parts.

Radiation Deadline

Deadline for compliance with the Federal Communications Commission regulatibns relative to radiation and communication interference is June 30. Users of induction and dielectric heating equipment which was installed or manufactured prior to June 15, 1947 must certify that minimum radiation requirements have been met. Requirements are set up in FCC Rules and Regulations, Part 18, obtainable from U. S. Government Printing Office, Washington 25.

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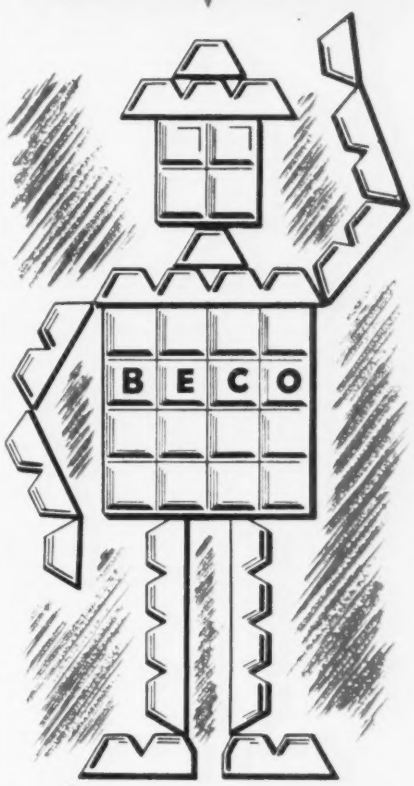

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New EQUIPMENT *and Supplies*

For Additional Information on these Items Use Reply Card—Page 229

(1)—Core Grinder: SPO Inc., 6449 Grand Division Ave., Cleveland 25—Portable core grinder is designed to handle a large range of core sizes and to produce uniformly flat faces without broken edges. Grinder employs an 18-in.-diam grinding wheel mounted on an adjustable head which locks firmly in any position. Maximum clearance between table and face of grinding wheel is 18 in., and maximum working capacity is 15 x 24 in. core surface. To speed production, small cores can be mounted in multiples in gang fixtures. Grinder is supplied with 1-hp, 220/440 v fully enclosed motor which drives grinding wheel at 660 rpm.

For More Details Circle No. 1—Page 229

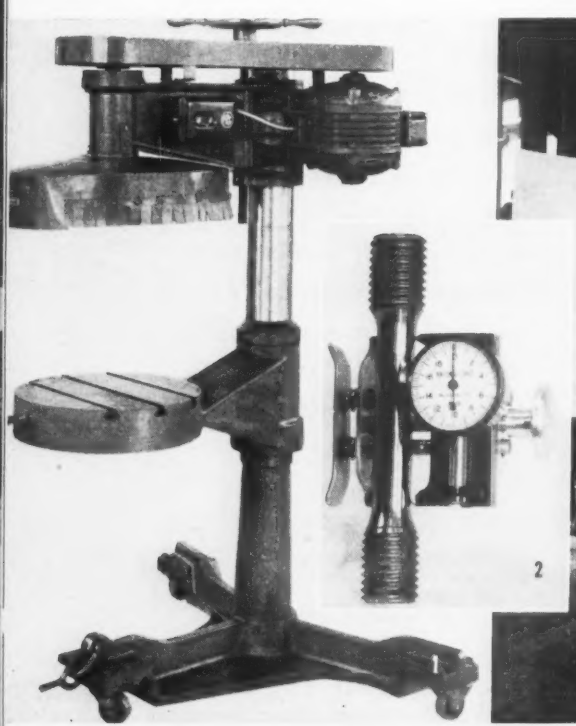
(2)—Extensometer: National Forge & Ordnance Co., Testing Machine Division, Irvine, Warren County, Pa. — Extensometer indicates elongation of metallic or plastic specimens in tension testing directly, without a multiplying lever. Unit weighs 7 oz and attaches to the specimen by spring clamps which are opened or closed while it is held in the palm of the hand. It adjusts to take wire, sheet, plate, or round specimens up to a maximum thickness or width of ½-in. Standard gage length is 2 in. Special gage length is 1.4 in. It registers elongation to 0.045-in. in dial gradients of 0.0002-in. Large dial on the jeweled indicator permits accurate readings to 0.0001-in.

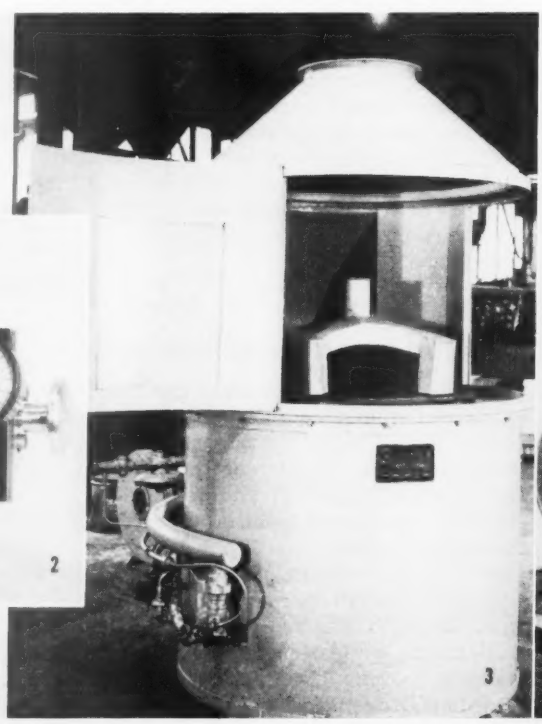
For More Details Circle No. 2—Page 229

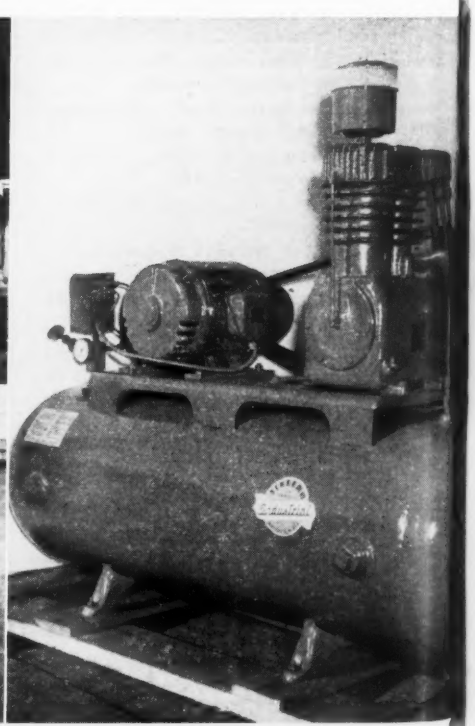
(3)—Magnesium Furnace: Stroman Furnace & Engineering Co., Division of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.—Magnesium melting and holding furnace comes with sulphur dome and hood. Provisions for hot charging through hood and dome are included. The unit is shown here with the hood open. Hoods also provide venting for combustion gases and sulphur and fluxing fumes. Furnace is available in 250, 350, 600, 800, 1200 and 1600 lb capacities, either oil or gas fired, with blowers attached. Automatic controls also are available.

For More Details Circle No. 3—Page 229

(4)—Air Compressors: Schramm Inc., West Chester, Pa.—Small, self-contained air compressors are built in sizes from ½ to 5 hp in single and two stage units. Models include: Bare compressor, with flywheel; on base with electric motor; on horizontal receiver with motor or gasoline engine; on vertical receiver, and on horizontal receiver. Features on receiver mounted, as illustrated, include: Safety and outlet valves, pressure gage and switch in a compact unit, large intake muffler with







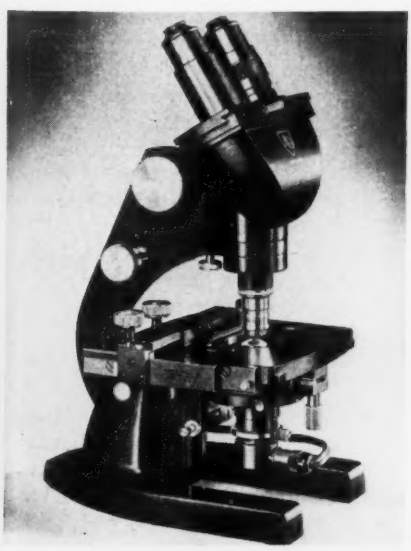
air filter, light wafer-type valves, air cooling fan-bladed flywheel, v-belt drive, controlled lubrication and efficient finned compressor cooling. Compressors are available with horizontal or vertical tank as may be required.

For More Details Circle No. 4—Page 229

Oxygen Indicator: Mine Safety Appliances Co., Braddock, Thomas, and Meade Sts., Pittsburgh 8—Improved oxygen indicator, for measuring oxygen content of atmospheres, can be used for a variety of operations in industry. It measures the oxygen content of inert and combustible atmospheres. Through measurement of oxygen content of fuel gases to indicate combustion efficiency it can show the way to substantial fuel economy. Instrument is available for any of the following standard, full scale ranges: Zero to 1, 5, 10, or 25 per cent. A large meter with 50 scale graduations makes possible direct readings of oxygen concentrations in gas samples to within 2 per cent of the selected scale range.

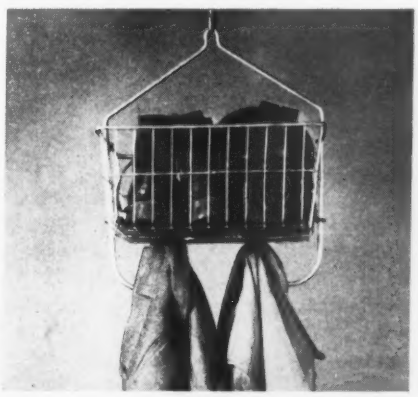
For More Details Circle No. 5—Page 229

Microscopes: American Optical Co., Southbridge, Mass.—New dark field microscopes feature mechanical and illuminating system improvements. Micro particles of a refractive index and color similar to the medium in which they exist are not readily seen in the ordinary microscope bright field. These new dark field microscopes make such particles luminous and visible by a cone of light striking the specimen from all sides at an angle to avoid entering the objective. Light source is centerable in relation to condenser optics, and the condenser is adjustable for slide thickness from 1.15 to 1.26 mm. An oil immersion objective is supplied with built-in iris diaphragm to eliminate a funnel stop. Either monocular or binocular instruments are available. Both have hinged substages to facilitate cleaning. Pinch-grip mechanical stage permits interchange of slides without disturbing stage settings. The coarse focusing mechanism has adjustable tension.



For More Details Circle No. 6—Page 229

Locker-Basket: Moore Co., 422 Professional Bldg., Charleston, W. Va.—Overhead storage baskets for clothing are designed to permit efficient use of space, good ventilation and economy of installation. Baskets are said to be sturdy, rust resistant, and will not tip. They have over 1200 cu in. of unobstructed space for storage of shoes, hat, packages, and other articles in addition to the hooks. Garments are suspended back to back on hooks, thus allowing free circulation of air, and preventing contact with clothes of adjoining baskets. The hooks are part of the hanger and are connected to the baskets with eye bolts. Baskets slide up and down on



the long shank. Thus, clothes suspended from the hooks will not slip off nor can they be knocked off, since the weight of the basket and its contents hold them in place.

For More Details Circle No. 7—Page 229

Fans: DeBothezat Fans Division, American Machine & Metals Inc., East Moline, Ill—Panel vent sets for ventilating industrial and commercial buildings are designed for use at free delivery or relatively low static pressure. Units are available with fan wheels 24, 30, and 36 in. in diam, with air moving capacities up to 13,190 cfm. They have totally enclosed ball-bearing motors, wound for dual voltage. Shutters and safety screen guards are available.

For More Details Circle No. 8—Page 229

Lift Trucks: Buda Co., Harvey, Ill.—Restyled and re-engineered fork lift trucks powered with either diesel or gasoline engine, are available in 12 models on solid or cushion tires in capacities of 3000, 4000, 5,000, 6000 and 7500 lb at 24-in. load center and 4000 lb capacity at 18-in. load center. Truck features include: All roller construction mast with special rolled mast channels; two speeds forward and two speeds reverse, single lever gear shift; quick change clutch; complete complement of electrical

gages on full front vision instrument panel; carriage mounted on patented adjustable side thrust rollers to reduce wear; complete accessibility of all parts for maintenance and servicing, and standardization and interchangeability of parts between all 12 models. The trucks are available in five standard masts with 72, 84, 108, 114, or 120-in. lift.

For More Details Circle No. 9—Page 229

Cold Solder: A. L. Okun, 148-26 58th Ave., Flushing 55, N. Y.—Cold solder consists of powdered aluminum in a quick-drying liquid vehicle, The material is applied fresh from the can with a putty knife. The vehicle evaporates, leaving the deposited aluminum in a smooth surface that will not crack, chip, peel or shrink in its recommended service, it is claimed. Its uses include filling seams and imperfections in metal assemblies; building fillets and producing dies for precision investment casting patterns; filling pits, blowholes and fractures in all castings, and for building up or revamping wood or metal patterns. When thinned with a solvent supplied by the manufacturer, the solder can be brushed or sprayed. Applied in this manner, it will form a metallic coating on patterns.

For More Details Circle No. 10—Page 229

Motor Drive: Reeves Pulley Co., 1225 Seventh St., Columbus, Ind.—Self-contained variable speed motor drive has capacity of 25 hp and is available in all speed ranges from 2:1 to 6:1. It combines in a single unit the speed-varying mechanism, user's choice of any standard constant speed motor, and a built-in helical gear reducer, when low output speeds are required. It is offered in

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horizontal and vertical designs. Handwheel control is standard, but electrical or completely automatic hydraulic controls also are available. A tachometer, calibrated to the user's specifications, also may be attached.
For More Details Circle No. 11—Page 229

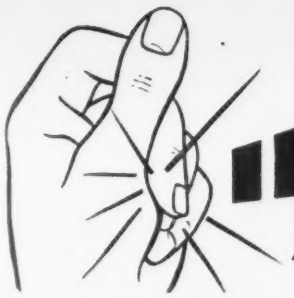
Emergency Light: General Scientific Equipment Co., 2700 West Huntingdon St., Philadelphia 32—Automatic emergency light provides 21-cp floodlight when regular power fails. The unit is plugged into any 110 v ac outlet, and, if there should be any interruption in the regular lighting circuit, the light comes on automatically from power supplied by a dry battery. The light clamps

on to a standard 6 or 7½ v dry battery, and is adjustable in any direction. Also available in direct current models, the unit is self-contained and can be carried for rescue or emergency work.
For More Details Circle No. 12—Page 229

Gear Reducer: Reuland Electric Co., Alhambra, Calif.—Fluid shaft motor and gear train have been designed into a single, compact unit to convert the motor's conventional high speed into a slow-speed, high-torque output. The fluid coupling provides cushioned starting of heavy loads and protection against jamming of equipment. Suggested applications are for cranes, conveyors, and other machinery where heavy loads require smooth acceleration at reduced speeds.
For More Details Circle No. 13—Page 229

Pallet Truck: Towmotor Corp., 1226 East 152nd St., Cleveland 10—A built-in generator has been developed for use with the company's elec-

(*Continued on page* 231)



IDEAS FOR FOUNDRYMEN

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

50. Electric Lift Trucks

Raymond Corp.—If you request bulletin 703, you'll get four pages of detailed information on high and low lift electric trucks. Pallet stacking models are shown with or without telescoping masts in 2000 and 3000-lb capacities. Low lift rider types are offered in two models for skid platforms or pallets.

51. Industrial X-Ray Equipment

Picker X-ray Corp.—"If It has to Do with X-ray Then It Has to Do With Picker." This is title of 14-page folder illustrating and describing line of industrial x-ray and radiographic equipment and accessories.

52. Aluminum Casting Alloy

William F. Jobbins Inc.—An aluminum-magnesium type alloy that offers high strength and ductility, high shock and corrosion resistance, good machinability and dimensional and physical stability is worth knowing about. So send for 12-page brochure and read all about Almag 35.

53. Core & Molding Machines

Osborn Mfg. Co.—Seven folders and catalogs bound into one informative booklet give descriptions and specifications of individual types of standard molding machines and core blowers. Attention is called to folder 25 on the Rota Lift machine which lists reasons for its application. For your cores of action, send for this booklet.

54. Liquid Core Binder

Swan-Finch Oil Corp.—Do you need a core binder that will reduce shakeout time and labor, increase oven capacity and cut cleaning room costs? Then get this 4-page folder that tells all about Tykor, the liquid core binder.

55. Continuous Power Conveyor

Richards-Wilcox Mfg. Co. — A straight line isn't always the answer. For continuous power conveying, maybe the Zig-Zag No. 2035 conveyor can straighten you out. 36-page brochure presents full description, installation pictures, suspension methods, and plant layouts for effective use of this track supported conveying system that meets requirements for light handling and negotiating short radius horizontal and vertical curves. Get catalog No. A-83-SP.

56. Incredible Crucibles

Electro Refractories & Abrasives Corp.—Need help in selecting the proper crucible for your particular foundry conditions? 4-page bulletin T-152 will give you up to date information on Tercod silicon carbide crucibles for brass melting, crucibles for aluminum, lids, covers and linings.

57. Castings Impregnator

Metallizing Co. of America—Weep no more over leaking and weeping castings rejected because of porosity or pinhole fissures. 8-page bulletin "Mogul Cast-Seal Impregnating Process" describes the M-30 Mogullizer which utilizes a cast seal colloidal solution to seal up defective ferrous and nonferrous castings. Castings thus sealed have withstood hot oil under pressures of 10,000 psi.

58. Industrial Dust Recovery

Buell Engineering Co.—How industrial dust recovery can boost plant yield, improve product and process and eliminate air pollution is outlined in this tabbed 24-page illustrated catalog No. 101. Cyclone, electric precipitator, low draft loss, combination and special systems are covered. This one won't gather dust in your files.

59. Overhead Handling Data

Cleveland Crane & Engineering Co., Cleveland Tramrail Div. — Complete engineering and application data on line of versatile overhead materials handling equipment is in this 12-page illustrated bulletin C-2303. Just about everything you would want can be found in this sterling presentation.

60. Versatile Fork Truck

Tracto Co.—Designated as the Paul Bunyan of fork lift trucks, this unit for heavy duty industrial use will not be a Blue Ox or Sacred Cow in your plant. As described in 8-page illustrated brochure which has specs, truck finds no job too tuff. With hopper, it can serve your foundry well.

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Helpful Literature" in this issue—simply circle corresponding item numbers on one of these cards

4-52

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61. Delivers Cool Air

Jas. A Murphy & Co.—How the Murphy ASF aftercooler-separator-filter (all one unit) operates, specs and prices are found in 4-page catalog No. 10. You can have your money back if this device, with "zip action" trap, does not deliver cool, clean and dry compressed air to pipelines.

62. Masonry Saw

Clipper Mfg. Co.—"Now. . .Dustless Cutting of Firebrick" is title of this 6-page well-illustrated folder that tells you how to save and save some more by use of a Clipper Masonry Saw. You'll have smooth sailing with a Clipper.

63. Pressure Cast Equipment

Accurate Match Plate Co.—16-page illustrated booklet "Aluminum Pressure Cast Pattern Equipment" will acquaint you with variety of aluminum production pattern equipment now produced by method of pressure casting into plaster molds. Included are match plates, cope & drag plates, core boxes and aluminum and white metal castings.

64. Genevas For Indexing

Geneva Machine & Tool Corp.—All the specs on four, five, six and eight-point geneva drives with any center distance up to 15 in. can be found in this 4-page illustrated folder. Cross sectional drawings keyed to tables, prices and a chart which aids in determining wheel outside diameter and driving radius for drive with up to 30 points are also included. This *will* help you.

65. Let Us Spray

Foundry Rubber Inc.—A hard, durable, tough, moistureproof and waterproof coating can be applied to sand cores, molds, match plates, sprues and chills with concentrated 5-in-1 Paraspray No. 5. How to use it, directions for handling and advantages in casting of ferrous and nonferrous products are related in 2-page instruction sheet. Ask for it.

66. Convenient Crucibles

American Refractories & Crucible Co.—How Starrbide bonded silicon carbide crucibles permit more metal per furnace per day to be melted and increase number of heats is explained in 4-page illustrated bulletin. Construction affords maximum capacity for given standard size. Tables give capacities, dimensions and other data on crucibles and base blocks.

67. Foundry Shakeouts

Allis-Chalmers Mfg. Co. has published two illustrated bulletins 07B6365-A and 07B7532 which give full information on Foundromatic two-bearing shakeouts. These production units range in capacity from 2000 to 50,000 lb in single models and up to 200,000 lb in multiple units.

68. A Vise Choice

Columbian Vise & Mfg. Co.—Be a vise guy and send for 4-page folder HV 7548-R which tells all about the No. 1004 hydraulic vise. A couple of pumps on the two-pedal foot control and you can put the squeeze on light castings and finished surfaces without crushing. Hands remain free to handle parts while the foot does the work.

69. Multi-Power Chipper

Rotor Tool Co.—Now you can select the chipper best suited for your job from 15 combinations of speeds, strokes and blows. 6-page illustrated bulletin 37 describes five basic sizes of multi-power chippers each of which adjusts to three speed and blow combinations. Line features the "doughnut" valve which allows piston to pass through hole.

70. Electric Shop Tools

Mall Tool Co.—Ten models of various types of craftsman and shop tools are described and illustrated in 4-page folder. These include electric drills, sanders, polishers and circular and chain saws. Also available is 6-page pocket-size folder No. 505 which covers seven models of light and heavy duty flexible shaft units for sanding, rubbing, polishing and finishing.

IMPORTANT READING FOR FOUNDRYMEN
We have a limited quantity of the following reprints which we can furnish while they last.

71. 100,000 Castings a Day

Just how a midwestern foundry produces tremendous quantities of alloy iron castings each day is related in 8-page illustrated reprint of an article written by Bob Herrmann, associate editor of FOUNDRY, entitled "Casting 100,000 Valve Seat Inserts Daily." Pictures show various steps employed from raw materials to finished products.

72. Oxygen & Castings

"Effect of Oxygen Content on Iron Casting Properties" by F. S. Kleeman, foundry metallurgical engineer, is an 8-page reprint of article which discusses causes of excessive iron oxide in gray iron and malleable iron castings. Effect of these oxides on microstructure and other properties is described.

73. Nodular Iron Dope

8-page illustrated reprint "Comparative Growth of Gray Iron vs. Nodular Iron" is written by Thomas E. Eagan, chief metallurgist, Cooper-Bessemer Corp. Included are photomicrographs which show microstructure of various materials both before and after being cyclically heated at 1650° F. Tables give properties, growths and chemical analyses of different materials.

74. Beryllium Copper Castings

How improved properties and broader applications have resulted from development of new casting alloys is subject of 12-page illustrated reprint "Beryllium Copper Sand Castings" by John T. Richards, development engineer, Beryllium Corp. Nominal and limiting compositions are tabulated, typical castings are shown, and physical and engineering properties of various alloys are presented.

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7	19	31	43	55	67	79	91	103	115
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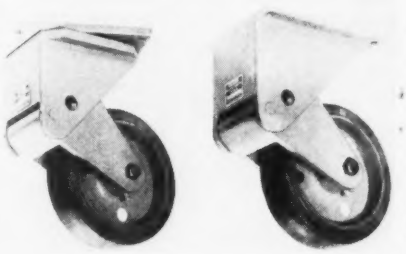
4-52

(*Continued from page* 228)

tric pallet trucks, eliminating the need for conventional electric storage batteries and recharging. A small, gasoline-powered generator supplies constant, maximum voltage for operation of the truck. The entire mechanism is enclosed in the steel housing formerly occupied by the battery. Generated power is said to be ample to move up to 4000-lb loads.

For More Details Circle No. 14—Page 229

Caster: All Steel Welded Truck Co., 1145 Railroad Ave., Rockford, Ill.—Knee action caster, designed to protect fragile loads, has a 2-in. vertical wheel motion when obstructions



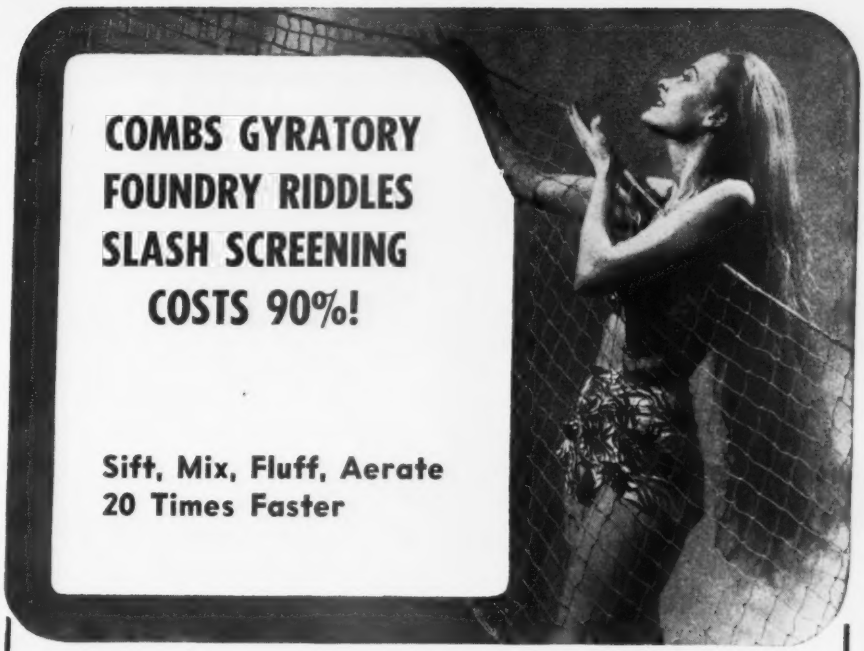
are met. Swivel and rigid types are available in wheel sizes from 6 to 20 in. in diam, with rubber, Neoprene, steel, composition, zero pressure, or pneumatic tires. Weight capacity of casters ranges from 90 to 1660 lb per caster. Heavier duty casters can be had on special order. Standard models are equipped with roller bearings, but ball or tapered bearings are available. Shimmy and "fish-tailing" is said to be eliminated because all wheels are in contact with the floor at all times.

For More Details Circle No. 15—Page 229

Sander: Millers Falls Co., Greenfield, Mass.—New 7-in. sander is designed for fast sanding, wire brushing, grinding and polishing of metal, wood, plastic, concrete and other sur-

faces. Its 7½-lb weight is well balanced and the two handles are said to give good control over sanding operations. No-load speed is 4500. It operates on 25-60 cycle alternating or

(*Continued on page* 233)



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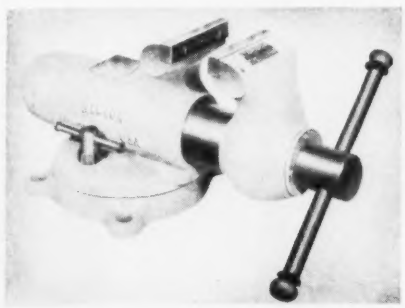
(*Continued from page* 231)

direct current. Sander is supplied with a 7-in. flexible rubber pad, 7-in. semirigid pad, and three 7-in. assorted cloth-backed sanding disks. Accessories include standard cup grinding wheels, wire cup brushes, and laminated phenolic grinding wheels and disks.

For More Details Circle No. 16—Page 229

Vise Safety Handle: Wilton Tool Mfg. Co., 925 Wrightwood Ave., Chicago 14—Shock-proof safety handle for machinist vises is designed to prevent finger pinching and reduce



noise and jarring. Vise handles have oil and grease-proof pliable rubber rings mounted against the handle knobs. Because of the "give" to these rubber rings, contact with the fingers is said to be harmless, even when the handle is dropped accidentally. Shape of the rubber rings is such that it forces the flesh away from the handle instead of wedging it into the spindlehead hole.

For More Details Circle No. 17—Page 229

Flask Pin: Martin Engineering Co., Kewanee, Ill.—New pin for foundry flasks is said to be nonbinding and to eliminate excessive tolerances which lead to increased scrap due to mismatching. Flexibility practically eliminates breakage of pins;

even when slanted to an exaggerated position the pin flexes and absorbs the abuse without binding or breaking. Pin is constructed from a cylindrically wound steel spring with a tapered end, and an initial tension, coil to coil, of approximately 25 lb. After forming, it is ground to give a continuously smooth surface. The pin

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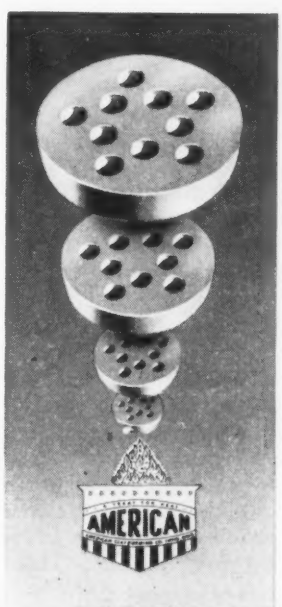

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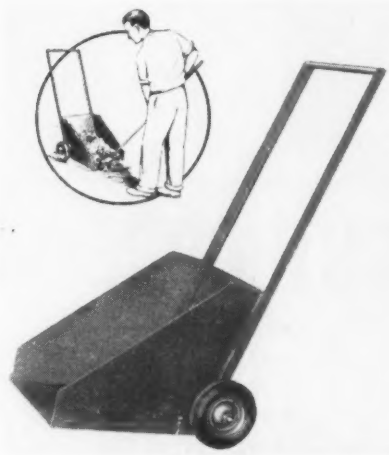
is furnished in standard diameters and various lengths to suit almost any application.

For More Details Circle No. 18—Page 229

Vibrators: Cannon Vibrator Co., 1111 Power Ave., Cleveland 14—"Quiet type" vibrators are furnished in 1¼-in. to 4 in. piston sizes. Ranging in weight from 9 to 140 lb, they are used to prevent arching, hanging-up, and sticking in bins, hoppers, chutes, etc. Air cushioned impact prevents metal-to-metal pounding, eliminating bolt breakage, reducing noise and general maintenance, and increasing vibrator life, it is claimed. The new vibrators incorporate heavy pistons with long strokes, and are said to create an effective pulsating and forwarding action.

For More Details Circle No. 19—Page 229

Dust Pan: Palmer-Shile Co., 16033 Fullerton Ave., Detroit 27—Dust pan may be rolled into position, debris swept into it, then rolled away. Unit weighs 45 lb and is all-welded



constructed to withstand rough usage in industrial plants. The 16-gage sheet steel pan measures 18x18x18 in. Frame is 1 x 1½ x ⅛-in. angle iron with handle of 1-in. tubing. Overall height is 48 in. Eight in. ball bearing wheels are rubber tired.

For More Details Circle No. 20—Page 229

Carbon Determination: Burrell Corp., 2223 Fifth Ave., Pittsburgh 19—Unit package carbon train for gravimetric determinations of carbons by combustion is a compact arrangement of throwaway and quickly replaceable glass cartridges containing reagents commonly used to determine carbon in metals. Two models are available. A single train is offered for average laboratory use, while a double train is intended for high production or for standby convenience. With the double train model, two determinations may be made simul-

(*Continued on page* 236)

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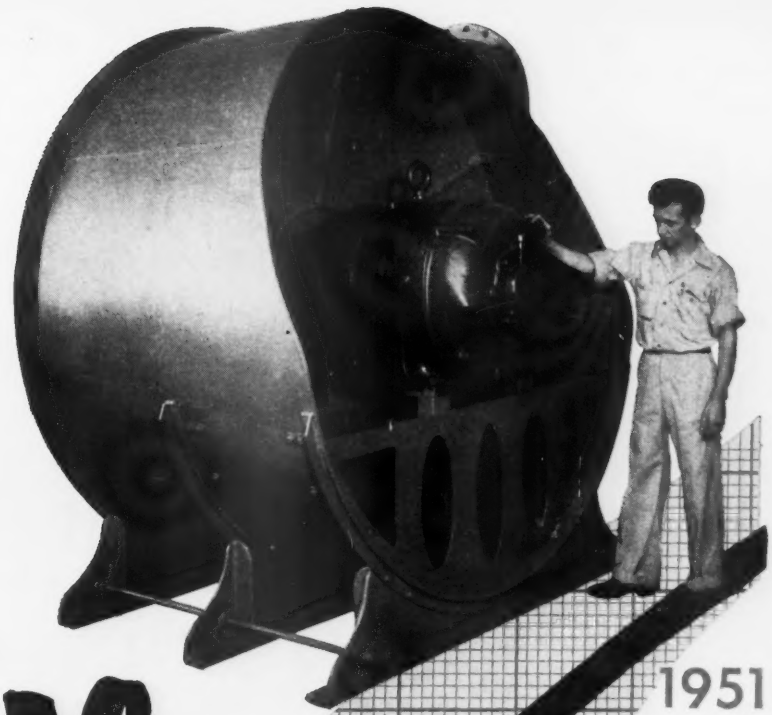

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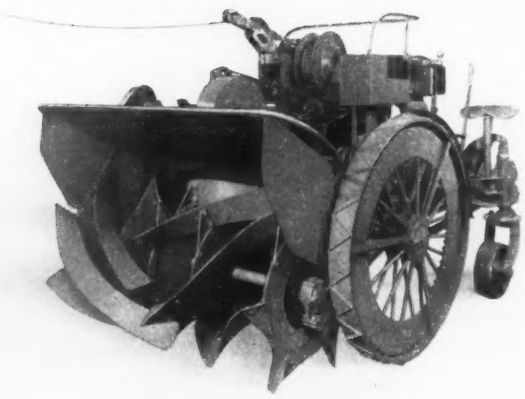

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(*Continued on page* 234)

taneously. Either model may be used with resistance or high-frequency combustion furnaces. Built-in timers for timing combustion periods have a range up to 5 minutes. A warning bell alerts the operator at the end of each time cycle. When used with the company's high frequency combustion furnace the timer also shuts off the power to the reaction coil. Two timers on the double train model operate independently. The four absorption tubes in the train comprise manganese dioxide for removal of oxides of sulphur, a drier tube to remove water vapors, a carbon dioxide absorption tube, and a fluid trap which seals the train in case of excessive oxygen demand.

For More Details Circle No. 21—Page 229

Heat Repelling Glove: Milburn Co., 3246 East Woodbridge, Detroit 7—Asbestos, aluminum-lined, reversible mitt is designed to protect the hands of workers exposed to radiated heat conditions. Constructed of a sheet of aluminum-coated fabric between two layers of heavy asbestos, the glove is jersey lined, providing good heat resistance without causing skin irritation. The specially treated asbestos offers high abrasive resistance. Experimental tests showed that this mitt reflects up to 90 per cent of radiated heat. No visible effects were indicated after handling objects heated to 1200° F. Mitt can be worn on either hand.

For More Details Circle No. 22—Page 229

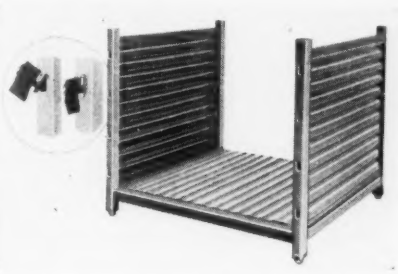
Power Ventilator: Burt Mfg. Co., Dept. F, 927 South High St., Akron 11, O.—Designed for localized removal of air contaminated with

smoke, fumes, dust and heat, this exhaust ventilator incorporates a direct connected axial flow fan. Air shaft extends above the fan and terminates in a pair of dampers that open and close automatically as the fan is turned on and off. Seven sizes with motors from ⅓ to 5 hp provide ca-

pacities ranging from 5000 to 75,550 cfm. Standard construction is galvanized steel but other metals may be used.

For More Details Circle No. 23—Page 229

Rack and Box: American Sales Engineers, Dept. 27, 141 West Eight Mile Rd., Detroit 3 — Corrugated, combination all-steel welded rack and box has 5000-lb capacity. Rack has tubular corner posts and deep drawn



nesting caps on each leg. Rack posts are punched with four slots and can be equipped with side bars made so that they are flush with corner posts. Bars also are made to extend out from the sides to retain parts wider than the rack. Bars are joined to, or removed from, side post sockets by tilting; when engaged, the bars cannot be jarred out of the sockets, it is claimed.

For More Details Circle No. 24—Page 229

Wet Blasting Materials: American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka 2, Ind.—Abrasives for wet blasting machines are supplied in sizes from 80 to 2500 mesh, and are packaged in corrugated cartons holding 50 lb for easy charging of the machine and storage simplification. Also supplied are an antipacking chemical and a liquid rust inhibitor which is said to go into solution immediately and to eliminate staining normally expected with inhibited water.

For More Details Circle No. 25—Page 229

Industrial Truck: Clark Equipment Co., 258 Champion St., Battle Creek, Mich.—Redesigned gasoline-powered industrial truck has a number of new features. To remove the hood and seat to get to the engine, it is necessary only to remove the radiator cap and air breather cap. For access to the engine for simple adjustments, louvers on both sides fold down to expose the engine compartment. An instrument panel is standard equipment. The gas cap is mounted outside the engine compartment to reduce fire hazard from spilled gasoline. A pull type brake replaces the hand brake on previous models. "No-kick-back" steering is

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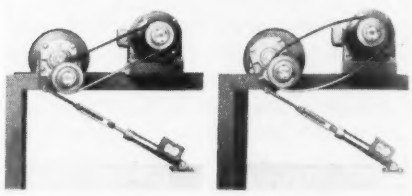
achieved by use of an Elliot-type axle with the tie rods in the same plane and more nearly in line with the forces they transmit, plus relocation of steering knuckles as close to the tire's dead center shock point as is practical. Better riding is attained through cushion tires on all models and rubber torsional bushings at pivot mounting points. Redesigned double cylinder tilt system gives better upright stability with smooth, positive control of tilt. A quick-change clutch has been developed to minimize downtime if changing of clutch becomes necessary.

For More Details Circle No. 26—Page 229

Overload Release: Dodge Mfg. Corp., Mishawaka, Ind.—Overload release for the company's torque-arm speed reducer is designed to provide



Set Tripped

instant and positive protection for driven machines, motors and the speed reducer itself. Release operates both mechanically and electrically to loosen the belts, cut off the current and activate a warning signal. Pressure exerted by an excessive load causes a piston to move lengthwise through the unit to loosen the belts and cut off the current simultaneously. The warning system is hooked up to a micro switch. Release can be set to act at any desired load up to the reducer's maximum capacity. To reset the release, the speed reducer is pulled back manually into position. This automatically cocks the release mechanism.

For More Details Circle No. 27—Page 229

Dust Collector: W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2—Cloth type filter, for collecting industrial dusts, features uniformly maintained suction, and removal of dust from filter bags by reversing the air flow. The fan on the system puts the collector housing under suction. A traveling device moves across the open end of the filter bags. This device has an air tube to the atmosphere, and the suction on the housing causes air to enter the traveling device and flow through one bag at a time in reverse direction, causing the dust on the outside of the filter bag to loosen and drop off. Constantly cleaning all the filter bags in this

manner is said to assure uniform suction at the dust sources, prolong bag life and eliminate the necessity for shutting down operation to remove accumulated dust.

For More Details Circle No. 28—Page 229

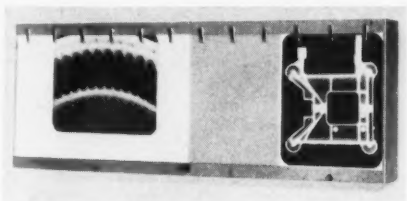
Core Drier Cleaner: Nielco Laboratories, P.O. Box 4703, Detroit 19—Alkali compound of free alkalies combined with buffers, inhibitors and surface active agents is said to be an efficient and safe cleaner for removing oxidized oils from aluminum core driers and aluminum, magnesium and steel core plates and boxes. Surface of the part is claimed to be unaffected by the cleaner. Equipment required for using the cleaner are two normal steel tanks with proper facilities for heating the solution to 212° F. The cleaning solution is diluted 8 oz per gal of water. When the parts have been cleaned they are rinsed in clean water.

For More Details Circle No. 29—Page 229

Transformers: Jefferson Electric Co., Bellwood, Ill.—Revised line of transformers for operating mercury vapor lamps include indoor and outdoor types. They consist of single and two lamp units, normal and high power factor, available for 115 and 230 v circuits. Several primary voltage taps are provided to permit close matching of the transformer to the line voltage. Outdoor transformers include aerial, pole top, pole base, and vault types for boundary lighting, building exterior lighting, and parking and shipping area illumination.

For More Details Circle No. 30—Page 229

Film Viewer: General Electric Co., X-ray Dept., 4855 Electric Ave., Milwaukee 14 — Illuminator, which



can be wall mounted, wall recessed or set up on a mobile stand, permits four 14 x 17-in., or smaller, x-ray films to be viewed side by side. Unit is 20½ in. high, 57 in. wide and 7 in. deep. Across the front is a 56-in. sheet of Plexiglas to diffuse the light, covered by a double-strength sheet of protective clear glass. Unit opens from the front for easy servicing. The mobile stand on which the illuminator may be mounted is equipped with a drawer for rulers, protractors, pencils, etc. Drip trays may be fastened to the panel.

For More Details Circle No. 31—Page 229

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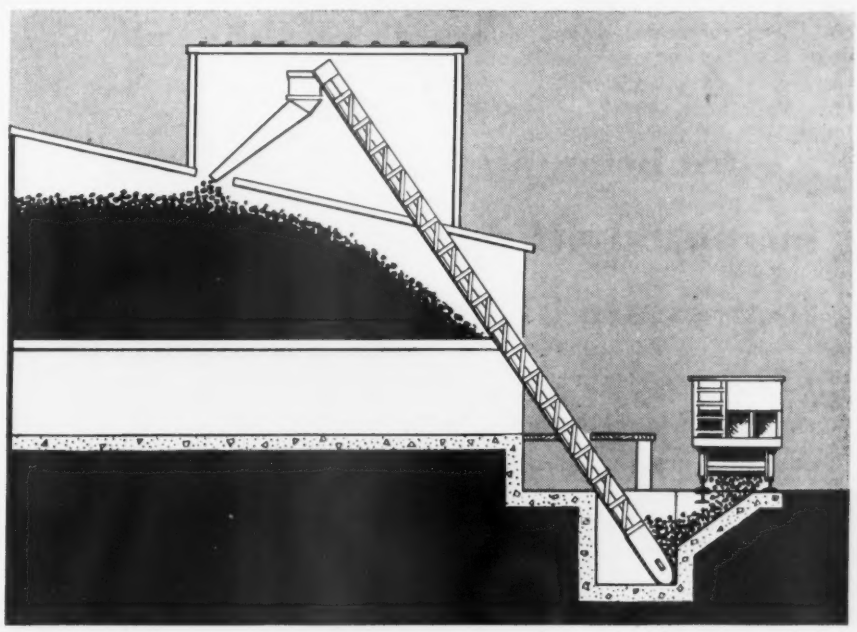

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Nodular Graphite in Iron

(*Continued from page* 99)

presence of traces of zinc in this iron. For iron K, it is possible that the 0.1 per cent titanium content may have had an inhibiting action.

Typical data related to heats treated with iron sulphide, boron, magnesium oxide, magnesite, and calcium are given in Table VII.

Iron Sulphide—The possibility that an iron sulphide addition to the molten iron would stimulate nodular graphite crystallization was investigated since some authors believe that iron sulphide may be an important factor in the process of graphite nodulization. Morrogh has shown that spherulitic graphite formation during the malleabilizing process occurs only in the presence of iron sulphide and that iron sulphide is frequently a constituent of the core of graphite spherulites. Manganese sulphide does not have this influence.

Iron was heated to 1650° C, cooled to 1380° C, iron sulphide equivalent to 0.01 or 0.02 per cent sulphur was added and the metal poured at approximately 1350° C.

Graphite tended to form in patches of oval and irregular shapes in the sand-cast bar and wedge-block specimens of these heats (Nos. 262 and 263, Table VII). These patches were not surrounded by ferrite rings nor did they respond to polarized light in the same manner as the regular graphite nodules. The number of patches was greater in the heat with the larger iron sulphide addition. No graphite patches were observed in the castings made from the same melts but not treated with iron sulphide.

The addition of iron sulphide did not result in the formation of true graphite nodules in the specimens as cast or in the annealed chill-cast bar. However, it is significant that the addition of FeS caused the formation of graphite patches in iron which otherwise would contain only flake graphite. Apparently these graphite patches are not sections of large graphite flakes but are graphite aggregates which, under more favorable conditions, would assume the form of regular nodules.

Boron—Boron is known to be a carbide stabilizer and it has been shown by the authors[13] that with certain boron contents the structure of the iron consists of small graphite flakes, cementite and small islands of fine pearlite within a structureless envelope, probably of ferrite. The possibility that such a structure might favor the formation of nodular graphite when boron cast iron is inoculated with a strong graphitizing agent such as calcium-silicon alloy was investigated.

Several heats were made in which stock iron 481 (Table I) containing 0.147 per cent B, was inoculated with 0.4 per cent Si added in the form of calcium-silicon. Clay-graphite crucibles were used. The approximate maximum heating and pouring temperatures were 1500° C and 1350° C, respectively. The data for heats 296 and 297 in Table VII are representative of the results from this group.

The graphite in the sand-cast bars and wedge blocks of these heats showed some tendency to crystallize in the form of irregular and nodule-like patches, although no true nodular structure was produced.

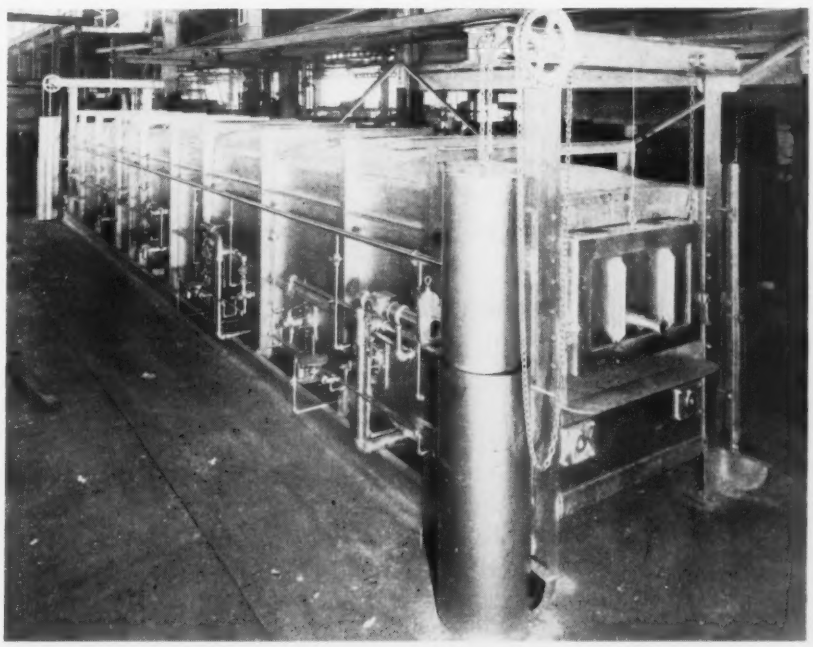
Magnesium Oxide and Magnesite—Most of the melts of this group were treated with 0.5 per cent magnesia added in the form of a fine powder. The object was to determine whether the fine particles of magnesia distributed throughout the molten metal would serve as nuclei for promoting globular graphite crystallization. Magnesia crucibles were used for heats 217, 218 and 219, and clay-graphite crucibles for the other heats of this group, represented by heats Nos. 258 B and 260 (Table VII). Heats Nos. 217 and 218 were superheated at 1700° C, cooled to about 1500° C and the magnesia powder added by throwing it onto the surface of the molten metal. The magnesia addition was made to the cold charge of heat No. 219, and the metal was superheated at 1700° C. Heats 258 B and 260 were superheated at 1600° C and poured into a preheated clay-graphite crucible containing the magnesia addition. No inoculation treatment was employed in heats 217 and 219. The pouring temperature in all heats of this group was 1500° C.

Only traces of magnesium were found in the castings made in this group. The microstructure of the sand-cast bars of the magnesia-treated iron consisted of large graphite flakes, irregularly shaped graphite patches, pearlite, and some free ferrite.

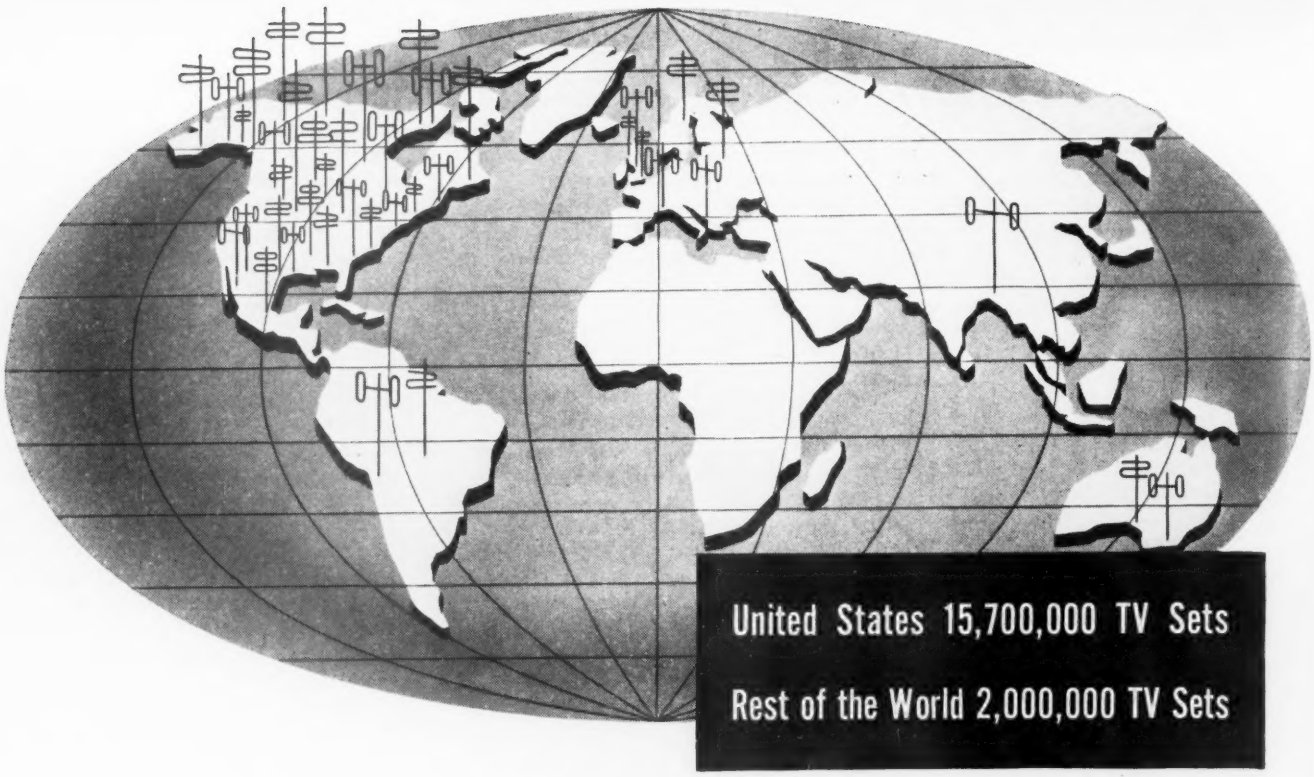
Graphite patches similar to those described above were present near the tips of the wedge blocks (1 to 2 in. from the tip) whereas in the heavier sections only graphite flakes could be detected by microscopic examination. It was observed that the graphite patches did not respond to polarized light in the same way as did regular nodules.

A few heats were made in which the molten metal was treated with magnesite ($MgCO_3$) to determine if magnesia freshly liberated by decomposition would be more effective, because of its minute particle size, than ordinary magnesia in producing

(*Continued on page* 243)



LONG OVEN: Double-end heat treat furnace, 40 ft long, built in the Toledo, O., plant of Surface Combustion Corp., recently was delivered to Whitehall Precision Castings Division, Michigan Steel Castings Co., Whitehall, Mich. It will be used for preheating and dewaxing investment casting molds. Five progressive zones each with automatic temperature will insure maximum dimensional stability through controlled expansion of the investment mold. Because of its length the furnace was delivered in two sections on flat-bed trucks and then reassembled



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THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE

(*Continued from page* 241)

nodulization. However, the graphite in the sand-cast bars and wedge-blocks cast from these heats remained flaky.

The results obtained with the magnesia treatment indicate that particles of magnesia suspended in the molten iron are ineffective in producing a structure of nodular graphite. As the irons treated with magnesium (retained magnesium of .03 per cent or greater) all contained nodular graphite, it is apparent that magnesium in solid solution is the agent for the formation of nodular graphite; not magnesium oxide.

Calcium — Clay-graphite crucibles, some washed with silica, were used for the heats in this group. The maximum heating temperatures and pouring temperatures were approximately 1500° C and 1340° C, respectively. Calcium was added to the melts in the form of calcium metal, calcium-silicon, copper-calcium alloy or calcium carbide.

Several methods were used in adding calcium and its alloys to the molten iron. Pure calcium was plunged beneath the surface of the melts either by means of an inverted perforated graphite crucible, or by wiring pieces to an iron rod. The recovery in these melts was very low, less than 0.01 per cent calcium.

Calcium-silicon (30-70) was added by throwing it onto the molten metal, and by placing it in a heated ladle and pouring the molten iron over it. Calcium carbide was added by throwing it onto the surface of the melt. Copper-calcium additions (containing about 15 to 20 per cent calcium) were made by throwing the alloy onto the melt, by pouring the molten iron into a heated ladle containing the addition, and by placing the alloy in an iron can and plunging it below the surface of the melt. None of these procedures was an effective means of introducing calcium into the iron, the calcium recovery ranging from 1 to 4 per cent of the total calcium addition (see Table VII).

Heats 329 and 330 were treated with calcium-silicon but not inoculated. Heat 292 was both treated and inoculated with this alloy.

Heats 313 and 316 were treated with copper-calcium and inoculated with Fe-Si (50-50), while heat 289 was treated with calcium carbide but not inoculated.

In the sand cast bars a few nodules were observed only with the melts containing 0.021 per cent calcium (Table VII and Fig. 6, A and B) whereas in metal rapidly cooled by pouring into water, some nodules were observed when the calcium content was only 0.011 per cent (Fig. 6C). In view of the fact that 100

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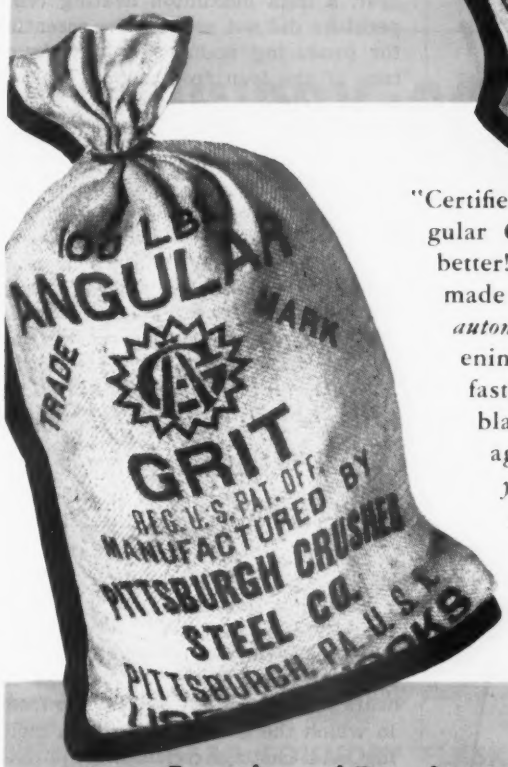

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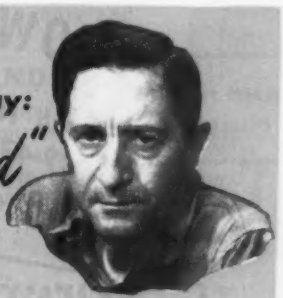

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per cent nodular graphite structures have been observed in calcium-treated irons by other investigators[14], the negative results obtained in these heats are probably the result of insufficient calcium in the iron. Production of a 100 per cent nodular structure by calcium treatment may require a calcium content similar in amount to the magnesium content of magnesium-treated iron.

Nickel, Molybdenum and Chromium—In an earlier (1940-1942) investigation at the National Bureau of Standards[15] a nodular graphite structure was observed in 1.2-in.-diam transverse test bars of an iron having the following composition: TC 2.83-2.88; Si 2.60-2.70; Mn 0.89-0.99; P 0.12; S 0.04; Ni 1.24; Cr 0.21; Mo 1.17-1.20 per cent. All heats were made in magnesia crucibles. The globular structure was particularly pronounced in the iron from the melt which had been superheated to 1700° C and poured at 1350° C into green sand molds (Fig. 6 D and E). However, a high maximum heating temperature did not seem to be essential for producing nodules as the structure of the iron from a melt heated to a maximum temperature of 1400° C was also partially nodular (Fig. 6F). The structure of the matrix of these irons was acicular and patches resembling the Widmanstatten pattern were observed.

In view of the important role magnesium is now known to have in the process of graphite nodulization in cast iron, magnesium picked up from the magnesia crucible during melting might be the agent responsible for the nodular graphite formation just described. However, spectrochemical analysis of specimens of iron still on hand from this earlier investigation showed the magnesium content to be less than 0.005 per cent, evidence that pickup of magnesium is not the explanation of the nodular formation.

It seemed advisable to determine if this nodule formation could be duplicated. Accordingly, a number of heats were made with Ni-Cr-Mo irons in which the chemical analysis, melting and casting conditions approximated those used in the earlier experiments. A few small widely scattered graphite nodules were observed in these irons but they were not as well formed nor as numerous as those in the earlier irons. The nodules in the alloy iron, in both this and the earlier investigation, differ from the nodules in magnesium treated iron in that they do not give the cross-pattern with polarized light. It should be emphasized that, although nodule-like graphite was present in these alloy irons, flake graphite was predominant.

(*Continued on page* 246)

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(*Continued from page* 244)

Discussion—On the basis of the double iron-carbon diagram Von Keil[3,4] has classified cast irons as follows:

1. Irons with eutectic points conforming to the iron-iron carbide diagram both on melting and freezing. Irons of this classification freeze as white iron.

2. Irons with eutectic points conforming to the iron-iron carbide diagram on freezing and to the iron-graphite diagram on melting. Von Keil produced in irons of this classification a free carbon structure which, in Gilett's translation, was called fine nodular graphite.

3. Irons with eutectic points conforming to the iron-graphite system both on melting and freezing. Iron of this classification contains free carbon as needle-like graphite.

Von Keil apparently considered nodule formation to occur before or during solidification of iron of class 2. The observations of Morrogh[5,6,7] that nodules tend to concentrate in the top portion of castings of nodular iron held molten for a considerable period before freezing and near the interior surface of centrifugally cast pipe would seem to confirm the belief that nodules form in the molten iron.

However, it has also been assumed that nodule formation occurs in iron which has solidified white and then graphitized during cooling without heat treatment. This assumption was based on the facts that magnesium and cerium are carbide stabilizers in cast iron. It was held that the magnesium stabilized the iron carbide during the freezing of the cast iron but that the carbide was unstable at high temperature in the solid state and dissociated to form graphite nodules. The breakdown of the carbides in magnesium-treated iron was considered somewhat analogous to the formation of temper carbon in malleable iron. Lately, this theory has fallen into disfavor as an explanation of the nodulizing mechanism.

The frequent appearance of geometrically shaped cores in the nodules might appear to support the theory that crystallization of the nodules is initiated by nonmetallic inclusions acting as nuclei and that these inclusions must be of a special crystalline form. This theory would explain the necessity for inoculation for consistent production of nodular iron. Absence of a core may indicate that the plane of the metallographic section is too far from the center of the nodule to include the core or that the core is too small to be seen. As previously pointed out, however, the results obtained in a series of tests made with magnesia indicated that magnesium oxide was not the nodulizing agent.

Bounin and Ivantzoff[16] investigated the process of graphite crystallization in cast iron by microscopic examination of specimens of iron quenched from different temperatures while only partially solidified. It was found that growth of graphite occurred principally at the eutectic temperature, only a small portion of the graphite precipitating at higher temperatures.

According to these investigators the graphite in regular cast iron grows while in contact with the liquid phase during the eutectic interval, whereas in magnesium-treated iron the graphite particles grow in an envelope of austenite which isolates them from the liquid metal. The space rquired for growth of the graphite is provided by self-diffusion or the movement of the iron atoms within the austenite. This self-diffusion is facilitated by the introduction of silicon, which, because of the difference in size between silicon and iron atoms, weakens the interatomic bonds in the austenite and alters its space lattice.

Iitaka[17] advanced the theory that

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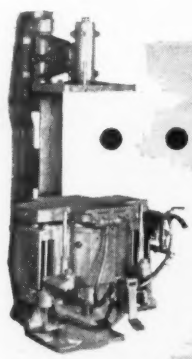

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six-sided columnar crystals of graphite are produced from nuclei under the condition of free growth. However, the graphite crystals, which are weak at high temperatures, break by slipping along their basal planes because of the relative movement of the graphite and the molten metal and form what Iitaka, using Dana's nomenclature, terms "slaty" graphite. These slaty crystals deform into curved plates, section of which appear as flake graphite under the microscope.

Crystals which do not break by slippage grow into granules or lumps. These lumps are plastic at high temperatures but their surface tension is insufficient to cause them to become globular. If, however, magnesium or cerium is present in the iron in amounts greater than the solubility at solidification, the excess separating as vapor is absorbed, in part, by the growing graphite. The increase in surface tension resulting from absorption of the metal vapor causes the graphite to become globular.

Iitaka ascribes the failure of the graphite to nodularize when magnesium or cerium treated irons are inoculated with graphite powder instead of ferrosilicon, to the magnesium or cerium vapor being absorbed by the added graphite instead of the precipitating graphite.

In the present investigation, nodules observed in minute iron particles from molten iron poured directly into water are evidence that these nodules were present in the molten iron, as the cooling period was far too brief to permit coalescence and nodulization in the solid state. The previously mentioned observations of Morrogh on nodule flotation, seem to confirm this. The secondary deposits observed around many nodules in this and in other investigations indicate that graphite from carbide decomposition in the solidified metal can deposit on existing nodules in preference to forming new nodules. Also the graphite "patches" or aggregates observed are probably the product of carbide decomposition after solidification.

Summary

1. The effects on graphite formation of treating melts of cast iron with magnesium, magnesia, magnesite, iron sulphide, calcium, nickel-chromium-molybdenum and boron were studied.

2. A wholly nodular graphite structure was found only in iron containing magnesium. Nodules of two types were observed: Radial and structureless. The structureless type frequently exhibited a crystalline core. Polishing scratches, also black marks or cracks, were seen on the surfaces of many of the cores. Nodules were usually round but some were triangular, rectangular or irregular.

3. The calcium treatments used were relatively ineffective in producing nodular graphite because of the small amount of calcium (0.021 per cent maximum) retained by the iron. Procedures which would introduce larger amounts of calcium were not investigated because of their complexity and commercial impracticability.

4. Addition of iron sulphide to the melts caused formation of patches or aggregates of graphite. Unlike the regular nodules these patches were not surrounded by ferrite, nor was their appearance under polarized light similar to that of the nodules.

Similar patches were observed in castings from melts treated with boron and inoculated with calcium-silicon and also in castings from heats with magnesia.

5. A nickel-chromium-molybdenum cast iron showed a few small graphite nodules somewhat similar to those observed in such an iron in a previous investigation. These nodules do not appear the same as the nodules in magnesium-treated iron when

(*Concluded on page* 249)

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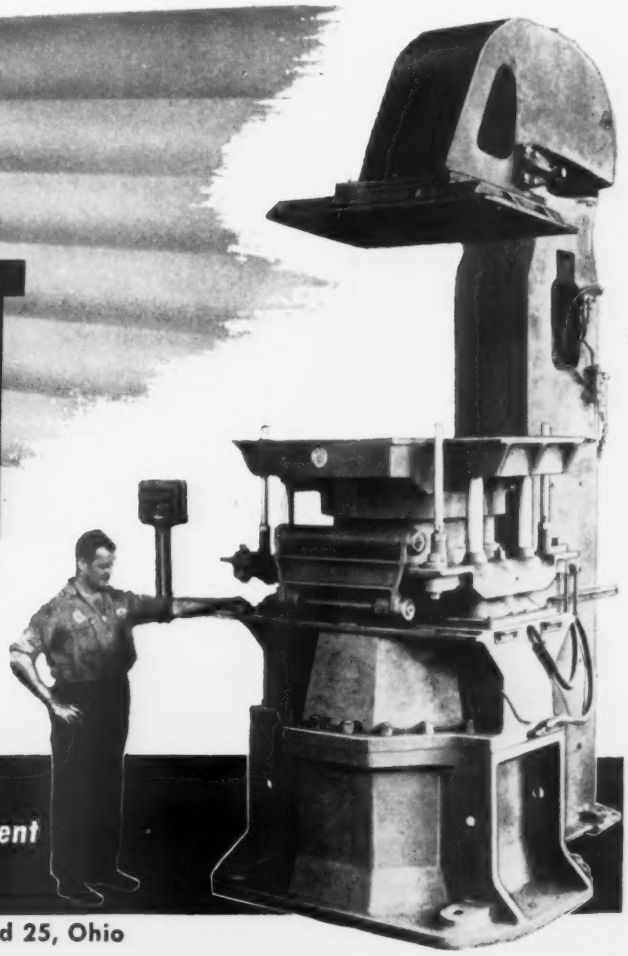

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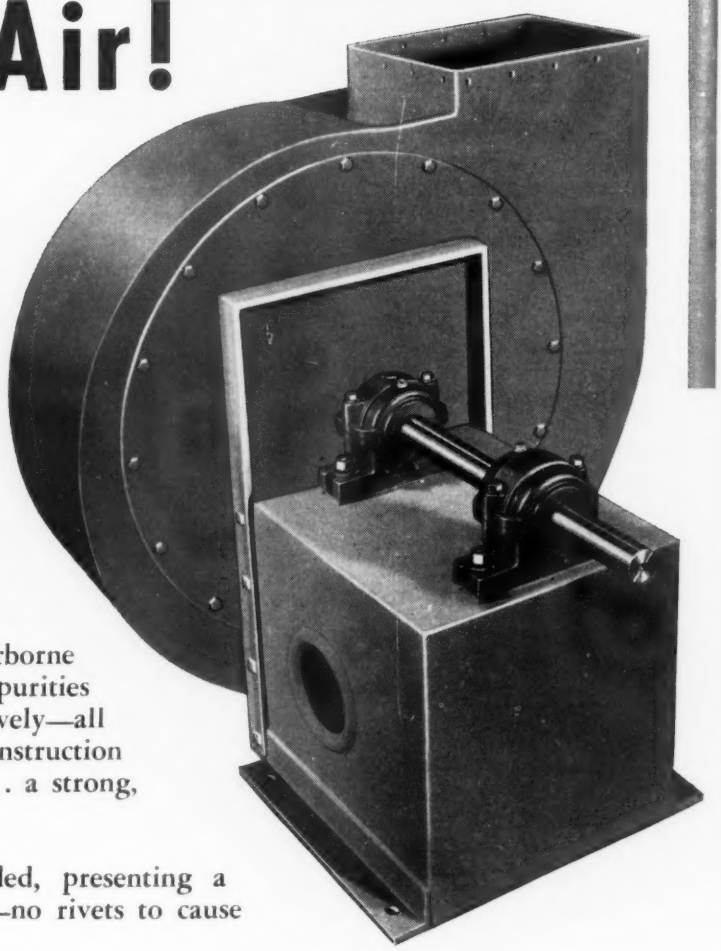

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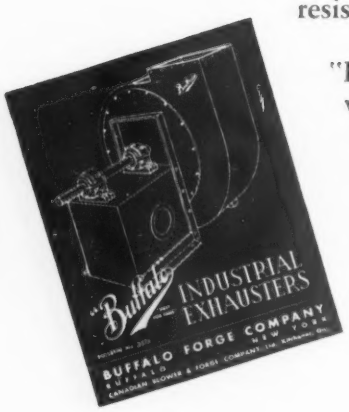

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(*Concluded from page 247*)

viewed with polarized light.

6. The decrease in concentration of nodules from the tip to the base of the wedge castings and the presence of nodules in the periphery but not in the central portions of some sand cast bars indicated that rapid cooling facilitated nodule formation. However, the formation of nodular graphite in magnesium-treated cast iron appeared to be relatively insensitive to the cooling rate when the magnesium content is sufficiently high.

7. The results of this and other investigations seem to justify the belief that nodular graphite is formed during solidification of the melt and that graphite patches or aggregates are the result of decomposition of carbide after solidification.

Theories have been advanced by several investigators to explain the mechanism by which addition agents such as magnesium or cerium effect nodulization of the graphite but sufficient evidence to substantiate these theories is lacking.

The authors acknowledge their indebtedness to Richard H. Harwell, Fred Raring and Harry C. Burnett Jr., for their assistance in this investigation and to the members of the Chemistry Division who made the analyses.

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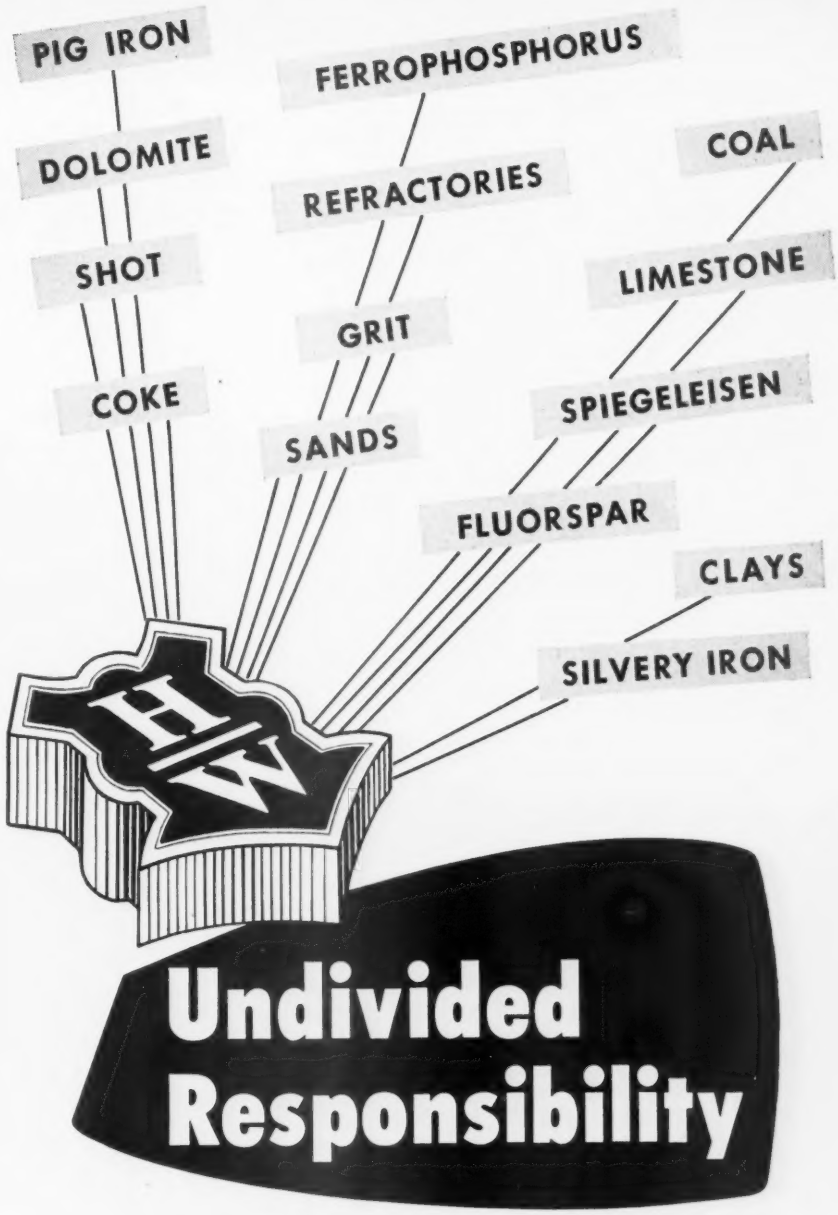

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Adventures of BILL

By PAT DWYER
Illustrations by RICHEY

AFTER looking over the program for the AFS convention and exhibition scheduled for presentation in Atlantic City, May 1-7, Bill remarked that the older he got—I wonder if "got" is the right word; sounds right but looks wrong—the older he got the more he was convinced each year is much shorter than the preceding year. He modestly admitted that he did not claim this as an original discovery. He had heard the same statement made by various people, especially by those creeping down on the far side of the old life trail. In the days of his youth a year extended to an almost impossible distance ahead. At times he doubted his ability to hang on to the string of life while the creeping snail year rolled from one anniversary to another.

"Look at it now," he gestured feebly with both hands. "One convention hardly is out of the way before another comes rolling in on top of us."

"That may be true of conventions in a general way," I said, "but does not apply to the coming convention in Atlantic City. The last time the foundrymen met there was in 1915. You don't have to go into higher mathematics to figure that was 37 years ago. The association was twenty years old and had reached the 1000 mark in membership. In their annual reports several officers referred to this item as a gratifying indication of achievement and progress. At the coming meeting we shall be reminded that in the intervening period the society has expanded beyond the most sanguine hopes of the enthusiastic group which guided the policies and practices of the association at that time. Attention will be directed to the fact that the society now has 48 chapters, approximately 10,000 members and confidently looks forward to further increased power, prestige and usefulness in the future.

"It is to be regretted that so many of the men prominently identified with the 1915 convention will not be present this year to note the extent to which their hopes and dreams have been fulfilled. To note the structure that has been erected on the solid foundation they laid down. 'Their swords are rust, their bones are dust; their souls are with the Saints we trust.'

"Seems to me the late Mr. Longfellow in his well known poem, 'The Midnight Ride of Paul Revere,' had a few appropriate words on the subject of man's brief period in the limelight and how soon he is forgotten. Hardly a man is now alive who remembers that famous day and year, the 18th of April in '75! Perhaps in the far-away days of your youth to which you referred so touchingly a few moments ago, you were dragged up to the teacher's platform and bullied into reciting the entire poem."

"Not me, my dear old one, not me. My teacher was a fossilized old crab, if ever there was one, but I'll say this for him, he knew who was who and what was what. He knew which of his young hellions could perform on the platform, and which was a total loss on the same job. He never called me up. Therefore I never followed Paul Revere in his midnight ride, or memorized Longfellow's description of the thrilling adventure.

"Through a peculiar and rather common trick of memory which enables us to forget what we should remember, and remember what we should forget, I shall recite for you the first verse of a parody I heard one night at a molder's smoker conducted by 106 in Boston: 'Listen my children and you shall hear, the bums in Joe's place shouting for beer. And how Dinney Eagan from The Light in Lynn, poured more stuff down the hatch than Gunga Dinn."

"Less of the levity my good man *if* you please. You start talking about the marching years. Then, for no apparent reason that I can see, you open the throttle and go bouncing and rattling down a weed-grown side track leading to a scurrilous parody that not only grievously maligns the spotless character of that sterling water carrier, Gunga Dinn, but will not even scan according to the specifications laid down by the International, Benevolent and Protective Order of Major and Minor Poets."

"A fat lot you know about parodies. In strict confidence and with the distinct understanding that this goes no further, I can tell you the boys thought it was purry good. They called Frisco Kelly back for three encores.

"Away back in those days I was a touring young molder. During the preceding year and in theatrical phrase I had played foundry engagements varying from a few weeks to

(*Continued on page* 252)

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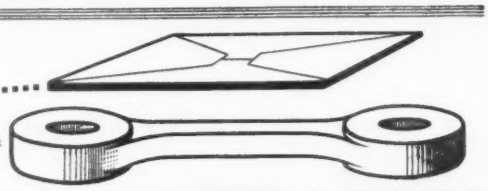

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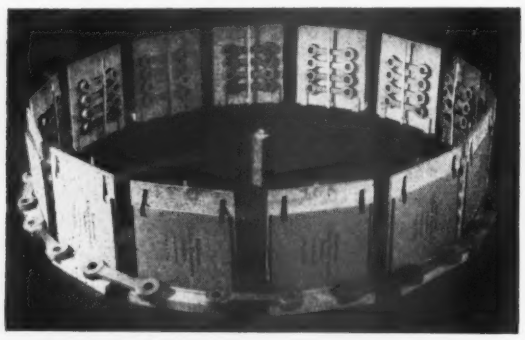
Illustration shows 60 steel castings being photographed simultaneously. The gamma rays, flying in all directions, go through all the castings at once, making 60 exposures of the 60 castings



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(*Continued from page 250*)

a few months in Nova Scotia, Quebec, Ontario, Detroit and Cleveland. Winds of chance, professional curiosity and a pair of itchy feet brought me to Boston in February, 1889. In the language of the time and place I confidently anticipated ketchin' me a job. To my surprise and deep chagrin the foundrymen of Boston showed a singular lack of appreciation of the opportunity presented to secure the services of a sterling performer. In a word, they all said 'NO.'

"One burly foreman who, I am sure—or at least hope—long since has gone to his high temperature reward, employed a technique which I am inclined to think he picked up at a former period as a bucko mate on a bluenose windjammer trading to the West Indies.

"To my modest request for a molder's job, he eyed me up and down with a pair of eyes like those in a duck. Did you ever take a good look at a duck's eyes? 'You a molder?' says he in a tone and manner that would have earned him a belt in the puss, if he was not so big and hairy and tough. He was partly justified in his opinion. I weighed a little over 100 pounds, soaking wet with a rock in each hand, and encased in two suits of fleece-lined underwear. Foundries in those days were no tropical resorts or gardens of Arcady in the winter time. I claimed that not only was I a molder, union card and everything, but that I was a very good molder, green sand, dry sand or loam. I modestly hinted I was not looking for a job on the side floor or in the dog house. In the foundry vernacular I performed only under de big hook.

"'I see,' says this snake in the bush. 'Where wuz ye workin' last?'

"I told him I had just closed a three-month engagement at the Fulton in Cleveland."

"'Cleveland, hey? One of them there hick towns away out west some place near a lake ain't it? How wuz business in the foundries there when ye say ye left?'

"I was young and innocent at that period, and had no suspicion of the trap he was setting for my unwary feet. I spoke up truthfully and bravely, as is my usual wont. I told him business was rushing. Every shop filled with work. Every molder, with the exception of a few chronic and professional bums, was working full time, 10 hours a day, 6 days a week. There is a genuine touch of ancient foundry history.

"He inserted the point of a grimy fore finger under one side of a heavy, drippy, droopy walrus moustache and exposed several very strong, very

crooked and very yellow teeth. With the moustache at the proper elevation to clear the torrent, he squirted a gill, or maybe a gill and a half of very potent tobacco juice, Polar Bear, about 50 Baume, very close to my nicely polished shoes, a la mode box toe, cloth uppers with red fleur de lis, Jordan & Marsh special all that week, $2.57. That also indicates the period.

"Subconsciously I estimated that in the run of an ordinary day and the mastication of a full paper of Polar Bear, he wasted enough byproduct to blackwash the teeth in the mold for a 6-foot diameter gear wheel with a 12-inch face. He dropped the hairy curtain back into place. Like the famous Clancy he also dropped or lowered the boom.

" 'Rushin' eh?' Sez he. 'Every shop filled with work, every molder except a few chronic and professional bums workin' full time, 10 hours a day and 6 days a week.' Then he took another spit and mowed me down. 'Why the hell,' sez he, 'didn't ye stay there?'

"Do you know, sometimes even yet after a hard day, I dream of him coming up from his permanent high temperature home and tracking slag, ashes and clinkers into my bedroom. Before I can nail him with the proper answer, with suitable gestures, I wake up and lose the chance, just as I did on that occasion to which I have just referred in a few brief and well chosen words. Any person, well, almost any person, can think of a crushing retort hours, or sometimes days after the occasion has passed. The lads and lasses I envy are those who instantaneously can snap the ball back to the pitcher and knock his block off."

"I trust you smooth down the hackles and emulate the voice of the cooing dove when friend or stranger asks you a civil question regarding some phase of foundry practice."

"O, that's an old jallopy with a new coat of paint. F'rinstance I had an inquiry the other day from a man who wanted advice about splitting plates. He had an order for a cast iron drum 60 in. diam., 48 in. face, weighing about 4 tons. The casting was to be split in the mold. On a former occasion he had tried to split a solid pinion 28 in. diam., 16 in. face with a steel plate coated with blacking. The result was not satisfactory. I pointed out that a single steel plate is not suitable for splitting a solid iron block 28 in. diam. Even under the most favorable conditions a coat of blacking hardly could be applied thick enough to prevent the iron from fusing to the plate. The principal danger from employing a steel plate

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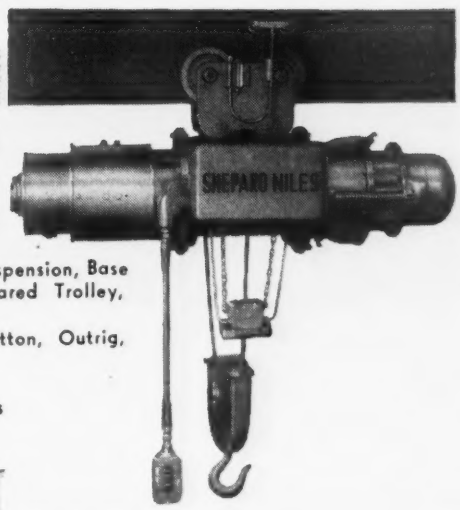

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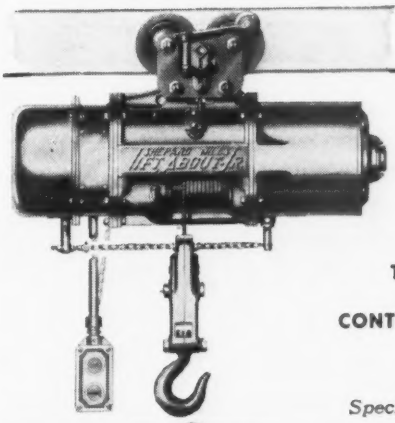

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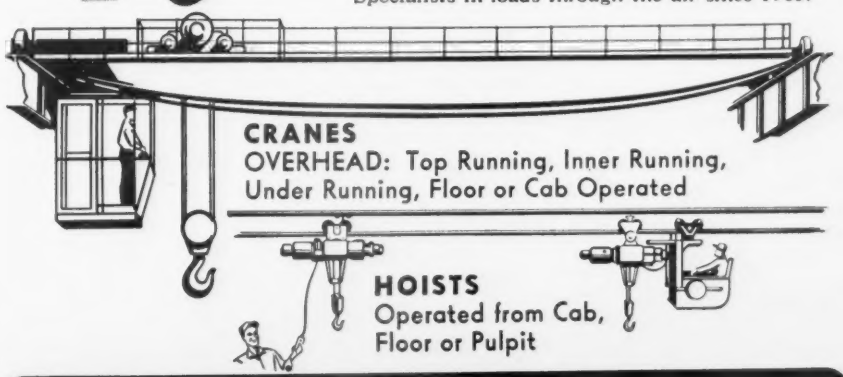

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is due to the fact that the plate usually is coated with a thin film of oxide scale. The blacking is applied without removing this film. The moment the molten iron touches the face of the plate the scale blisters off and takes the blacking with it. The iron unites readily with the unprotected surface.

"If he was forced to use steel splitting plates I suggested he use two, face to face. Adjoining faces would be coated with blacking, and the outside faces deliberately cleaned so that they would fuse to the respective faces of the casting. Countersunk holes would be staggered through each plate, so that the molten iron will come through and help to anchor the plates in place. Care must be observed to see that the holes in one plate do not come opposite those in the other plate. Holes also are drilled or punched for the bolt hole cores. In the great majority of cases, a thin splitting core made from an oil sand mixture will serve more satisfactorily than a plate.

"He did not state the metal thickness in the drum, but I assumed that the casting was the usual type with a double set of arms and a metal thickness 1½ to 2 in. Plates may be employed for splitting this casting provided they are perfectly clean and then coated with blacking on one face. However, cores are employed freely for the purpose. Taking all factors into consideration, cores are preferable to plates.

"At one time a certain amount of prejudice existed in connection with the use of thin splitting cores. The sand was bonded with flour, was rammed hard, and flour was used to excess to produce a hard, stiff core. The cores were not vented. As a natural result blowholes appeared in the casting in the vicinity of the cores. Sharp sand bonded with oil or an oil base binder produces satisfactory thin splitting cores. Other types of binders also produce satisfactory splitting cores where the coremaker is familiar with their characteristics and uses proper discretion in the amount incorporated in the sand mixture. Whether cores or plates are employed, they do not project through the casting wall. A certain amount of metal is left intact. If the natural contraction of the casting does not split this small metal part, the metal easily is forced apart after the casting has been machined.

"In the drum under discussion the splitting core or plate will project through the lugs and extend to within in about ¼-in. of the outside face of the mold. The hub splitting plate or core will extend to within ¼-in. of the hub center core."

Gates and Heads

(*Continued from page* 107)

are in contact so fast as to create the severe stresses that produce transverse tears. Chills of this type, however, have the disadvantage that they often freeze fast to the casting and cannot be removed with chipping tools; if they cannot be left in place they must be burned out with the gas torch or the carbon arc.

For many years steel foundrymen have hastened the solidification of hot spots in their castings by using heavy-headed chill nails and bars, coil chills, rods, etc., which are engulfed by the steel, partially melt and unite with the metal around them. Chills of this type usually will prevent the formation of shrinkage cavities in the sections where they are used, without the risk of causing exterior transverse tears, as heavy external chills do. If too light, however, they do not cool the metal fast enough to prevent the formation of shrinkage cavities, and if too heavy they do not fuse with the casting at all.

Chills Source of Weakness

In the latter case there are usually small cavities between the chills and the steel, which are readily revealed by radiographic examination, and are necessarily a source of weakness. When internal chills are used in bosses that are to have central holes drilled through them, lack of fusion between chill and metal is of little consequence, as the chill is generally smaller than the hole, and so is completely removed. In many cases, however, such cavities seriously weaken the casting.

If they are allowed to become rusty or moist before the mold is poured, internal chills cause gas cavities at and near them, produced by water vapor, or by CO formed by the reaction between the rust (Fe_2O_3) and the carbon of the steel. A thin coating of nickel or copper on the chills prevents their rusting in storage, and some concerns use no internal chills that have not been nickel-flashed for this purpose. The condensation of moisture on the chills is usually caused by placing cold chills in a green sand mold. In dry sand practice, internal chills should not be set in place before the mold is dried, because they tend to become coated with substances evolved from the binders in the sand. It is better practice to have them placed by the closing gang.

As dry sand molds are often too hard to drive chills into, they are set in holes made with drills. In the production of large steel cast-

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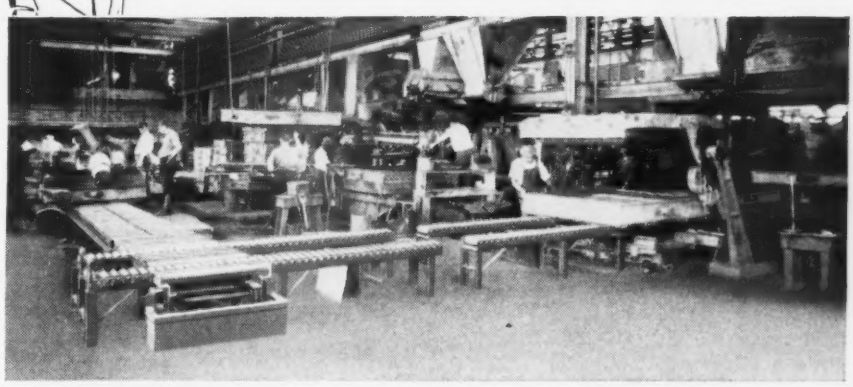

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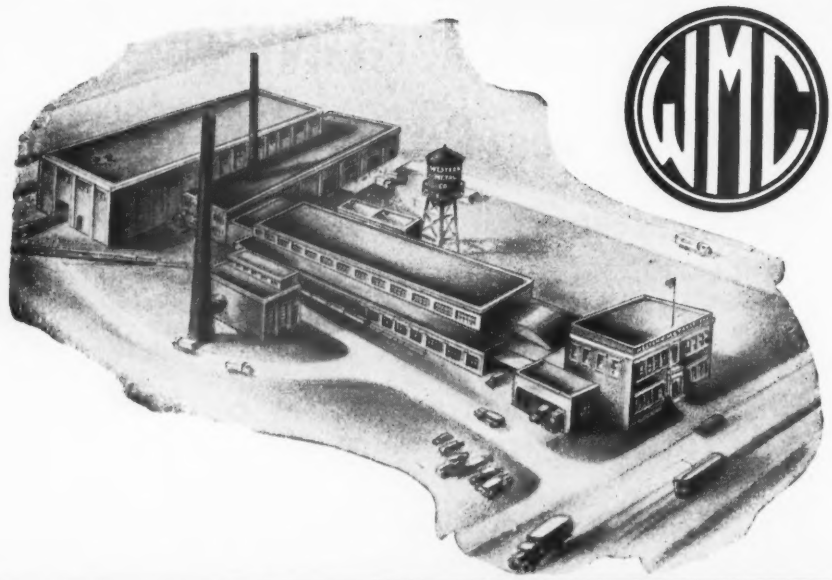

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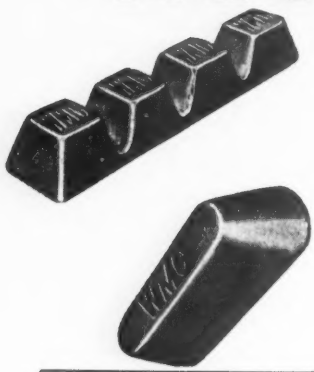

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ings, the setting of the chills may require many hours of labor, and often a welder is called in to fasten the several pieces together so that they will not be dislodged by the flowing steel when the metal is poured into the mold.

Chills Around Cores—When a hole of comparatively small cross section must be formed by means of a core in a heavy part of a casting, internal chills are sometimes used to make the steel solidify quickly around the core, and so prevent its being penetrated by the metal. For this purpose, flat pieces of plate are formed into a sort of elongated box, fastened together with heavy wire or by tack welding, and spaced perhaps an inch away from the core on all sides by means of chaplets. To permit the steel to flow freely into the area between the core and the chills, the latter are usually punched full of holes ½ or ¾-in. in diameter. By this method, cores that would otherwise be penetrated so badly that they could not be removed from the casting, will generally produce an opening from which the sand can be removed without difficulty.

Brackets and Cracking Strips—Instead of placing external chills at the intersection of plain sections to prevent the formation of hot tears, it often is preferable to cut slots in the sand to form brackets connecting the intersecting members at intervals of an inch or so. Flat sections in which hot tears are found to form are similarly reinforced by means of what are called "cracking strips," formed by cutting slots in the sand. When so located that they will "draw," cracking strips may be formed by thin wooden or metal strips permanently fastened to the pattern.

Brackets and cracking strips should be considerably thinner than the sections of the casting at the points where they are attached, so that they will solidify and cool earlier than the casting. By the time the casting has cooled down enough to create interior stresses of sufficient intensity to produce hot tears, the brackets or cracking strips have reached a temperature at which steel has enough strength to resist quite high stresses. The casting itself is thus so reinforced that the stresses due to contraction are not high enough to produce hot tears. To act most efficiently, brackets or cracking strips should be set fairly close together, and when used on light sections, should be as thin as they can be made, without danger of misruns. If they are too thin, of course, even very hot steel may not fill them com-

pletely, and they are of no use.

Even when properly designed and placed, brackets and cracking strips will not always keep a casting from tearing; sometimes it will cut squarely across them. Redesign of the sections of the casting may then be required, to equalize the cooling rates of its different parts so that late-cooling sections are not subjected to the excessively high contraction stresses that produce hot tears.

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Nonferrous Castings

(*Continued from page* 97)

dimensional changes, as well as visual inspection, were used to determine whether galling has taken place. The results for a few of the cast alloys are summarized in Fig. 12. Metals susceptible to seizure move rapidly out of the boundaries of the diagram, in a path beginning at the origin and travelling at an angle of 30 to 75° from the zero line in either a positive or negative direction. Gall-resistant combinations show a negligible change in dimensions. Briefly, the tests show that the silicon hardened Monel and Inconel, as well as the tin-hardened graphitic nickel, resist galling.

As previously mentioned, nickel-base alloys, including the Monel types, employ chromium, molybdenum and silicon for strengthening and hardening purposes, as well as for their contribution to corrosion and heat resistance. High-temperature hardness and stability become important factors in elevated temperature service. The position of "S" Monel in comparison with other similarly used materials is listed in Table III. Hot hardness makes these alloys valuable for valve and pump trim material in high temperature steam service as well as in other hot corrosive environments in which hardness and abrasion resistance are interdependent requirements.

Tests[6] upon modified "H" Monel retainers for roller bearings in gas turbines, showed that they possessed an ability to deliver 3 to 4 times the life of silver-plated yellow brass and promise to permit usage at higher temperatures.

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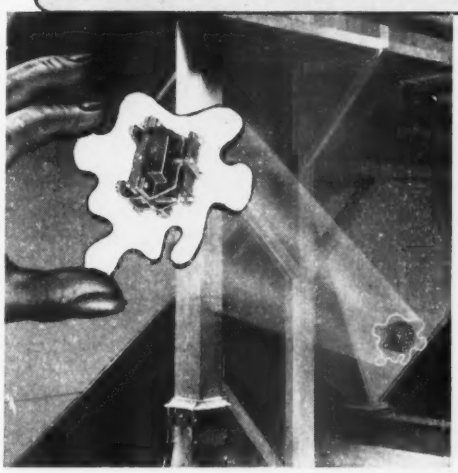

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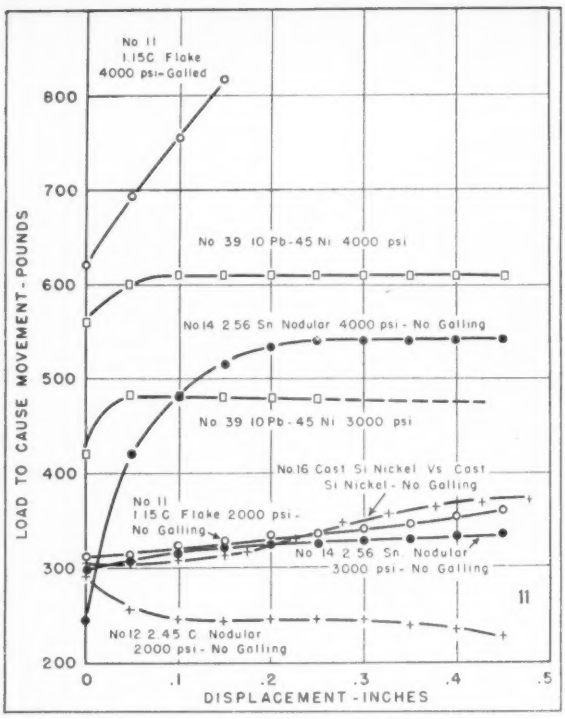

Fig. 11—Galling tendencies of nickel alloys of Table V. Measure of "resistance to seizure" indicated in flattened (parallel to base line) lead-displacement curve

TABLE III—Brinell Hardness at High Temperatures*

Metals	70° F	700° F	900° F	1050° F	1100° F
SAE 3140 steel	347	285	179	74	...
13% chrome iron	444	415	415	269	163
"S" Monel	321	321	311	335	293
Haynes Stellite	404	290	269	234	285

* M. G. Bolinger and William Heilig, William Powell Co., *Power*, April 1938 (Revised 1952)

TABLE IV—Typical Sand Mixtures for High-Nickel Alloys

(Sand washed and dried, AFS No. 70)

		Green Sand		Dry Sand	
Permeability	Over 80	Corn flour	.50	Corn flour	.50
Green strength	4 to 6 psi	Seacoal	.50	Gum (resin)	1.00
Dry compression	50 lb min.	Western bentonite	4.50	Western bentonite	4.00
Gas evolution	Low as possible	Moisture	3.00	Moisture	4.50

essed by welding. The copper-free types are especially well suited for this procedure, while the copper containing types work well if silver soldered. Most of the alloys contain precipitation hardening ingredients and are sensitive to heat changes within certain temperature ranges. Monel metal in the regular grade is weldable and its aptitude for welding may be improved by employing its softer and tougher compositions.

Subnormal Temperatures — The Monel and nickel-base alloys which do not contain an excess of precipitation hardening elements, and which possess a high order of toughness, as indicated by an elongation exceeding 25 per cent, are, in general, unaffected by changes in temperature down into the subnormal freezing temperature levels.

Application—Nickel-base alloys are employed for applications requiring a superlative performance in resistance to tarnish, filming, product contamination and discoloration, as well as to resist the coarser forms of corrosion, heat and wear to which metals are subjected. They constitute the cast alloys that take over industrial services which the cheaper materials are considered incapable of performing successfully or in which the more common materials have disqualified themselves by failure.

Machined forms of the high-nickel alloys always possess a color and luster of richness and beauty. Rough

(*Continued on page* 260)

TABLE V—Composition and Hardness of Seizure-Tested Cast Alloys

Alloy No.	Alloy Type	Fe	Ni	Cr	Cu	Graphitic C	Total C	Mn	Si	Mg	Others	Remarks	Hardness, Bhn
39	Cupro Nickel	..	45.0	...	Bal.	...	...	...	2.0	..	8.0 Pb	.....	238
24	"S" Monel	1.5	62.5	...	30.3	...	.09	4.0	...	..	...	age hardened	350
16	Silicon Nickel	..	Bal.	...	...	...	.25	.90	7.5	.05	.10 Ti	.....	389*
28	Silicon Inconel	1.9	Bal.	13.3	...	...	.04	1.20	5.5	.06	...	.....	240
11	Graphlake Nickel	..	Bal.	...	...	1.06	1.15	1.64	2.32	..	...	flake graphite	90
12	Graphnode Nickel	..	Bal.	...	...	2.19	2.45	1.60	2.01	.16	...	nodule graphite	118
14	Graphtin Nickel	..	Bal.	...	...	...	.98	1.40	2.40	..	2.5 Sn	tin	146

* Vhn

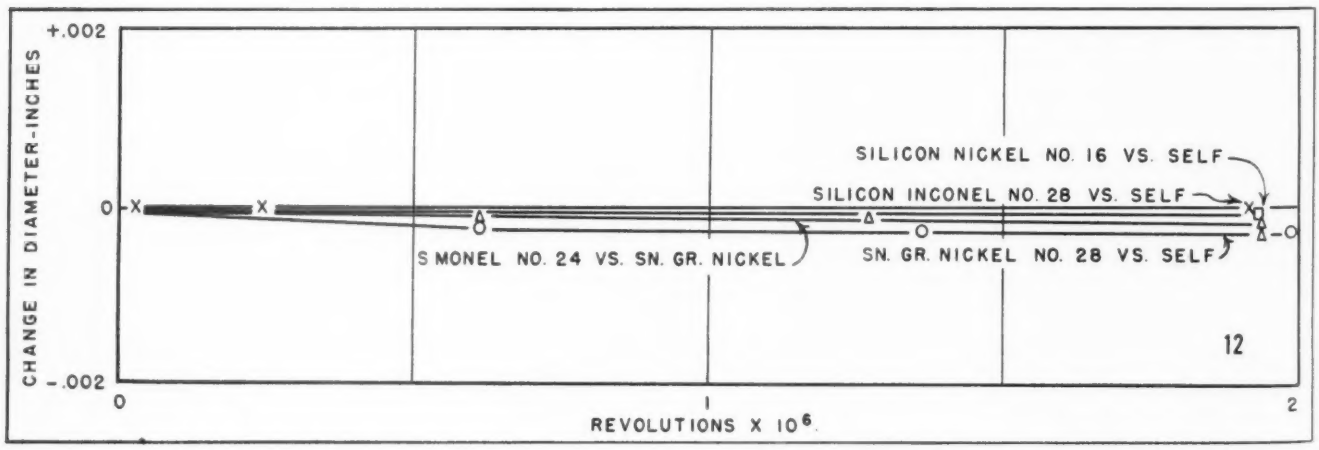

Fig. 12—Uniform wear, supplemented by visual inspection, indicates resistance to galling in the silicon-alloyed and tin-graphite alloyed nickel-base compositions listed in Table V

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(Continued from page 258)

castings are dull gray in color and unattractive, symbolic of the rugged service to which they will be exposed.

Pumps and pump parts, such as impellers, liners, sleeves, wearing rings and valve seats, constitute common applications. Valves, valve seats, valve disks, bushings, glands and fittings are similar familiar uses.

Heaters, heat-exchanger parts, condensers and condenser fittings for handling mildly corrosive vapors or aggressive chemicals, call for these alloys. Agitators, mixers and filter castings for the soap, paste, cosmetic and drug or chemical industries are typical examples.

Bushings, bearings, valve guides and slides are typical of important metal-to-metal contact operations in which cast alloy parts resist wear or seizure while in an environment of hot vapors or corrosive fluids. The nongalling advantages of several of the alloys in the group become important.

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Corrosives that are as mild as fresh water, sea water, or steam, may be handled with these castings with a view toward permanence or stability in performance. Meters, instruments, control mechanisms, valves, and parts for boiler-feed water pumps are typical mechanisms.

Food products, soaps, detergents, drugs and dyes are examples of mild corrosives which are contaminant-conscious and susceptible to damage from corrosion products such as iron, copper, etc.

Vigorous corrosives such as acids of the hydrochloric, sulphuric, acetic, formic and hydrofluoric types, and their salts, encounter a substantial barrier to their rapid digestion of processing equipment when the equipment is made from metals in the high-nickel family of alloys.

The usage of nickel-base alloys has expanded in step with the growing consumption of similar high-grade alloys, and in keeping with our increasing industrial activities. The high degree of skill required for the preparation of molds, and the expensive melting equipment needed for the production of castings, makes a family of unusual alloys for unusual purposes out of these products.

Acknowledgments — Acknowledgement is due to Messrs. Eash, Kihlgren, Talbot and Kozlik of the staff

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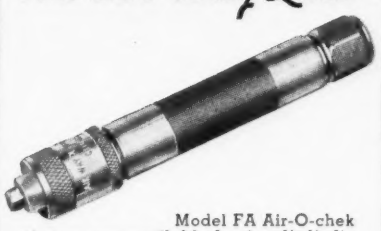

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at the Bayonne Research Laboratory of the International Nickel Co., Inc. Special mention might be made of the work on seizure by Messrs. Talbot and Kozlik which has not received prior publication. Manufacturers of the special alloys mentioned, supplied illustrations and data for their products and to them, too, my thanks are due.

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Gray Iron Design

(*Continued from page* 110)

have some internal stresses in them which may cause warping during machining. The higher-strength irons usually have the highest internal stress. Unless these stresses are deliberately put into the casting for strengthening purposes they should be removed by a stress-relief anneal. A rather complete discussion of stress relief is given in the book *Engineering Properties of Cast Iron*.[2]

It is not sufficient to call for a stress-relief anneal, because there are many erroneous ideas as to what constitutes a proper stress-relief-annealing treatment. On this subject no standard of recommended practices has been issued by the various technical societies. Therefore it is necessary that the annealing cycle be indicated either by a special specification or noted on the drawing. As a guide the following rules are used by the author's company:

1. Heat castings slowly and evenly at a rate not to exceed 50°F per hr to 1050°F.

2. Hold at 1050°F for 1 hr per in. of heaviest section.

3. Cool at a rate of not more than 400°F per hr until a temperature of 500°F is reached, then air cool.

It is well to discuss briefly some of the erroneous ideas about stress-relieving gray iron. Schaum[3] has shown that no relief of stress occurs in castings by storing them for 1½ years outdoors, yet this practice is

(*Concluded on page* 263)

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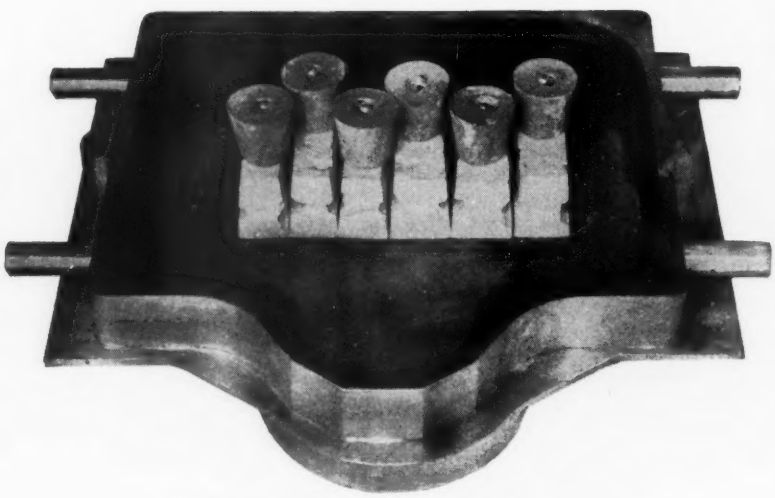

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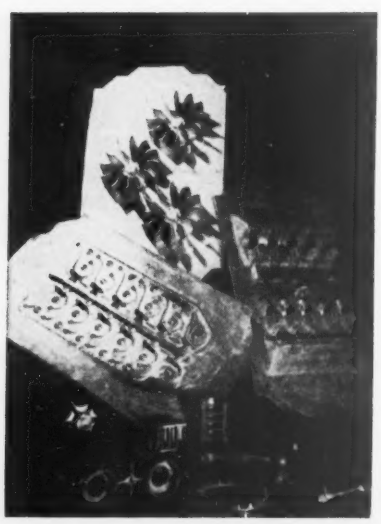

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(*Concluded from page* 261)

still used. Alternate heating to 220° F and then cooling to 0° does not remove stress. Etching the surface shows a small amount of stress relief but not enough to be of any consequence. Schaum also has shown that it takes many, many hours to relieve stresses at temperatures below 950°F, yet some foundries use temperatures as low as 500°F. There is only one good way of relieving stress and that is to follow a similar procedure to that recommended in the foregoing.

Great progress in design work has been made in the last few years by the use of the various methods of stress analysis. Where the cost is warranted this is the best method of getting a properly designed casting. The use of the newer stress-analysis tools has served to change the design of many castings. Also they have been influential in changing our thinking on the calculation of stresses. The ASTM "Symposium on Testing of Cast Iron With SR4 Type of Gage"[4] gives a number of illustrations of the use of these tools and their effect on design.

A casting will be no better than its design allows the foundry to make it. There are more gray iron castings which have been overdesigned than there are which have been properly designed. This is due mainly to the fact that designers have not been cognizant of the characteristics of the modern gray irons and, therefore, have not used them properly. Hence it is recommended that the designers become more familiar with the engineering properties of gray iron and use them to the best advantage.

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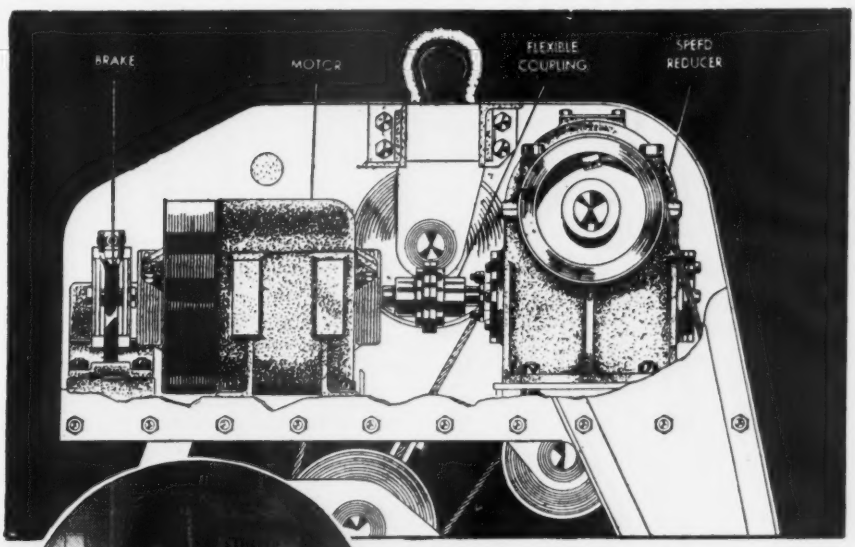

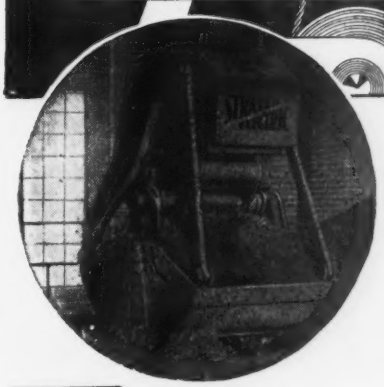

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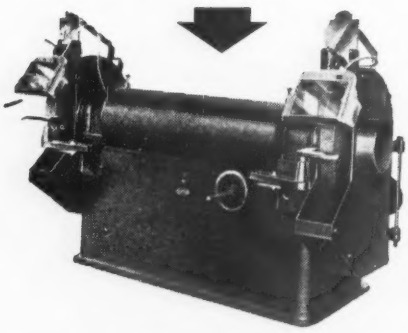

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For More Details Circle No. 90—Page 229

TRUCKS: Clark Equipment Co., Industrial Truck Division, 258 Champion St., Battle Creek, Mich.—Condensed catalog by visual cross-reference charts shows specifications by model and capacity for gas and electric fork-lift trucks, towing tractors, powered hand trucks, hand pallet trucks, hand platform trucks and hand stackers. Truck attachments and devices also are shown.

For More Details Circle No. 91—Page 229

CRUCIBLES: Electro Refractories & Abrasives Corp., 344 Delaware Ave., Buffalo 2—Bulletin T-152 describes silicon carbide crucibles, including certain sizes in a newly patented design, for melting nonferrous metals. Separate tables give crucible sizes and capacities for melting brass and aluminum. Other tables cover furnace linings and covers.

For More Details Circle No. 92—Page 229

VISE: Columbian Vise & Mfg. Co., 9021 Bessemer Ave., Cleveland 4—Bulletin contains descriptive literature and specifications on company's hydraulic vise, featuring 4-in. jaws with maximum jaw pressure of 4000 psi and maximum hydraulic pressure of 7000 psi. Vise is controlled by two foot pedals—one for power, the other for release.

For More Details Circle No. 93—Page 229

REFRACTORIES: Laclede-Christy Co., 5900 Manchester Ave., St. Louis 10—Bulletin 41 covers castable refractories and metal and refractory anchors for these refractories. Physical properties of the various refractories, suggested applications, and proper mixing, drying, burning and curing practices are given.

For More Details Circle No. 94—Page 229

CONVEYORS: Transall Inc., 109 North Eleventh St., Birmingham 4—Catalog 203 contains specifications and descriptive material on prelubricated belt conveyor idlers and belt conveyor systems.

For More Details Circle No. 95—Page 229

INSTRUMENTS: Minneapolis-Honeywell Regulator Co., Brown Instruments Division, station 40, Wayne & Windrim Aves., Philadelphia 44—Bulletin 1051 covers a new line of noncontrol pyrometers and resistance thermometers. It includes wiring diagrams and circuit information of pyrometer, resistance thermometer, tachometer, and other actuations. Catalog 100-4 gives technical data on application and use of thermocouple pyrometric supplies.

For More Details Circle No. 96—Page 229

CRANE TRUCKS: Baker Industrial Truck Division, Baker-Raulang Co., 1250 West 80th St., Cleveland 2—Bulletin 1613 describes two locomotive type crane trucks with capacities of 6000 lb at 7-ft radius and 10,000 lb at 5½-ft radius. Engineering specifications, drawings, and cutaway photos of component parts are included.

For More Details Circle No. 97—Page 229

BATTERY CHARGERS: Motor Generator Corp., Box DM-909, Troy, O.—Automatic motor generator chargers for industrial truck batteries are covered in a new folder. Principles and theory of operation of the sets are explained for charging all types of Edison and lead batteries used in motorized hand and driver-ride electric trucks.

For More Details Circle No. 98—Page 229

HEAT TREATING: Surface Combustion Corp., Toledo 1, O.—Bulletin SC-155 discusses industrial applications of gas chemistry for heat treating. Exothermic and endothermic type atmosphere generators are described and compositions of each gas atmosphere and the respective heat treat process applications covered.

For More Details Circle No. 99—Page 229

MOLDING MACHINES: Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35—Jar squeezer, jarring, roll-over, flask lift, and vibrator molding machines having greatest versatility for handling short or long run production work are described in 12-page bulletin. Specifications are included.

For More Details Circle No. 100—Page 229

GRINDING: Hammond Machinery Builders Inc., 1605 Douglas Ave., Kalamazoo, Mich.—Catalog 75 covers company's complete line of abrasive belt and wheel, grinding, polishing, and buffing machinery. Information and specifications on cyclone and filter type dust collectors complete the catalog.

For More Details Circle No. 101—Page 229

STRAINER CORES: American Clay Forming Co., Tiffin, O.—Folder describes ceramic strainer cores and includes a chart of specifications on the eight standard sizes offered.

For More Details Circle No. 102—Page 229

TESTING MACHINES: Riehle Testing Machines Division, American Machine & Metals Inc., East Moline,

Ill.—Catalog RU-7-52 contains illustrations, specifications and operating details on hydraulic universal testing machines with capacities up through 400,000 lb. A section is devoted to accessories and instruments.

For More Details Circle No. 103—Page 229

CUTTING BLOWPIPE: Linde Air Products Co., Unit of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Bulletin describes a cutting blowpipe suitable for oxy-acetylene or oxy-fuel gas operation and can be adapted for gouging, beveling plate edges, powder cutting and other special cutting operations.

For More Details Circle No. 104—Page 229

AIR CONDITIONING: Buffalo Forge Co., P.O. Box 985, Buffalo 5—Bulletin 3703A describes horizontal and vertical air conditioning cabinets in sizes from 875 to 22,000 cfm. Capacity tables, diagrams, charts and detail photos to aid in selecting proper unit for given conditions are included.

For More Details Circle No. 105—Page 229

INSTRUMENTS: Wheelco Instruments Co., 847 West Harrison St., Chicago 7—Volume 11, number 2 of the company's house organ, contains an article describing application of strip chart recorders, controllers and combustion safeguards at Alumicast Corp., Chicago.

For More Details Circle No. 106—Page 229

AIR COMPRESSORS: Cooper-Bessemer Corp., Mt. Vernon, O.—Bulletin M-65 contains engineering data covering motor-driven compressors in ranges from 250 to 1000 hp with standard two-stage units and 300 to 1000 hp with standard singe-stage units.

For More Details Circle No. 107—Page 229

MATERIALS HANDLING: Towmotor Corp., 1226 East 152nd St., Cleveland 10—Job study 108 describes materials handling methods at Columbia Malleable Castings Corp., Division of Grinnell Co., Columbia, Pa., manufacturer of valves, pipe fittings, etc.

For More Details Circle No. 108—Page 229

TOOL CARE: Rotor Tool Co., 17325 Euclid Ave., Cleveland 12—Interestingly illustrated bulletin 39 offers suggestions on maintenance, application and safe operation applicable to all makes of 180 and 360 cycle electric tools.

For More Details Circle No. 109—Page 229

CELLULOSE GUM: Cellulose Products Dept., Hercules Powder Co., Wilmington, Del.—Booklet describes properties and uses in various industries of water soluble cellulose gum. In the foundry it has been used as a core binder. Its characteristics for this purpose are outlined.

For More Details Circle No. 110—Page 229

FURNACE EQUIPMENT: Westinghouse Electric Corp., Box 2099, Pittsburgh 30—Booklet B-4695 discusses application of electrical equipment to direct and submerged arc furnaces. Equipment described in-

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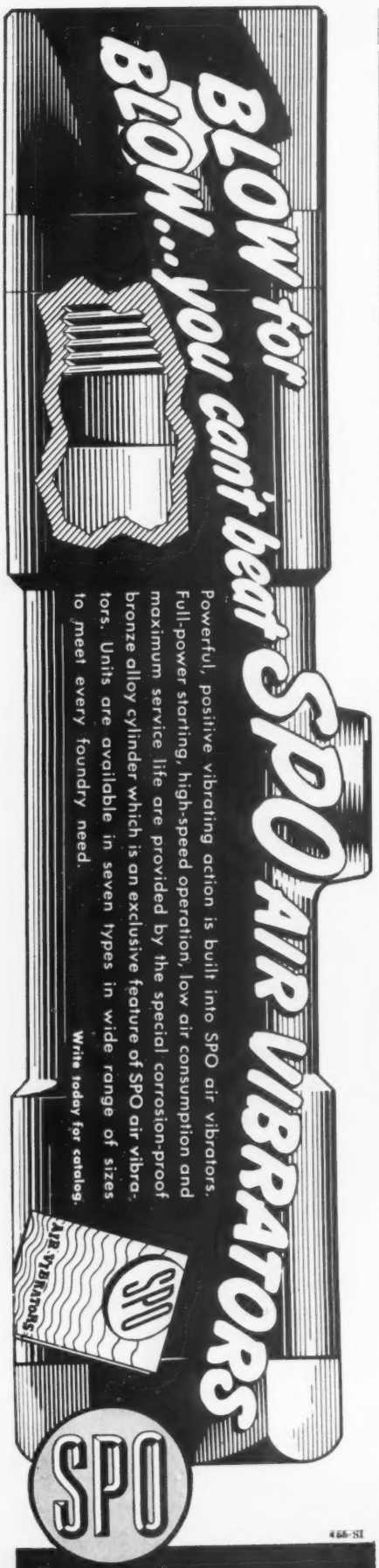
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For More Details Circle No. 111—Page 229

PYROMETERS: Claud S. Gordon Co., 3000 South Wallace St., Chicago 16—Folder describes pyrometers for high and low temperature indications and the various themocouples for use on the instruments.

For More Details Circle No. 112—Page 229

WHEEL GUARDS: Morrison Products Inc., 16816 Waterloo Rd., Cleveland 10—Company's line of drawn steel wheel guards for portable, flexible shaft and bench grinders are desecribed in brochure.

For More Details Circle No. 113—Page 229

TESTING EQUIPMENT: General Electric Co., Schenectady 5, N. Y.—Catalog GEC-1016 lists all of the company's testing and measuring equipment for laboratory and production line use.

For More Details Circle No. 114—Page 229

GRINDING: Norton Co., Worcester 6, Mass.—Folder lists the company's offerings of "know how" literature and motion picture films and describes the company's school of grinding.

For More Details Circle No. 115—Page 229

INOCULANT: International Nickel Co., Dept. EZ, 67 Wall St., New York 5—Folder describes a nickel-silicon alloy inoculant, metallurgically designed to improve machinability, add toughness, and increase wear resistance of gray iron castings.

For More Details Circle No. 116—Page 229

GLOVES: Mine Safety Appliances Co., Braddock, Thomas, & Meade Sts., Pittsburgh 8 — Bulletin CF-30 describes a plastic-coated, all-purpose work glove said to shed moisture, resist chemicals, and to be long wearing.

For More Details Circle No. 117—Page 229

BASKETS: Hoffman Co., 41-43 North Penn St., York, Pa.—Illustrated folder lists sizes and specifications of various types of metal baskets, dippers, strainers and containers for use in handling parts in processing operations.

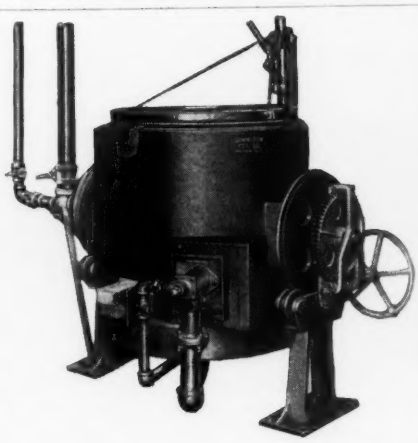
For More Details Circle No. 118—Page 229

DUPLEXING: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—"Facts on Duplexing," an 8-page paper, gives suggestions on how to improve existing duplexing systems and how to establish efficient, new duplexing arrangements.

For More Details Circle No. 119—Page 229

TRACTOR-SHOVEL: Frank G. Hough Co., 703 Seventh St., Libertyville, Ill.—Catalog 208 covers company's 1¼-cu yd capacity tractor-shovel, describing and illustrating important design details and providing complete specifications.

For More Details Circle No. 120—Page 229



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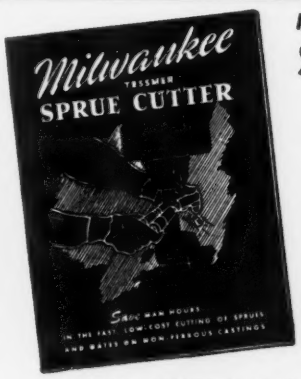

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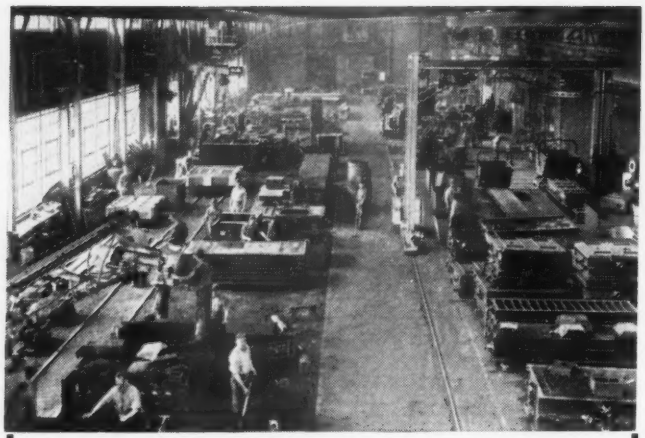

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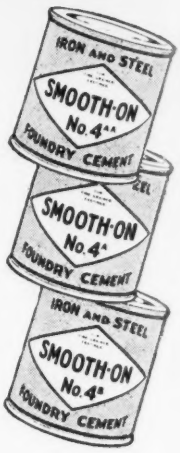

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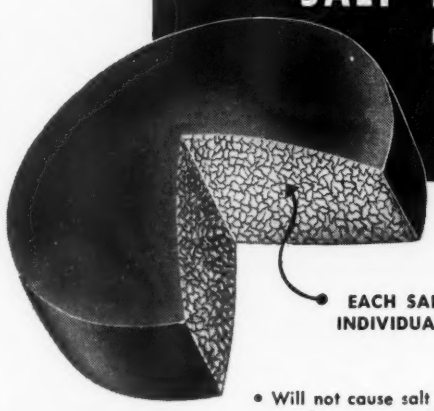

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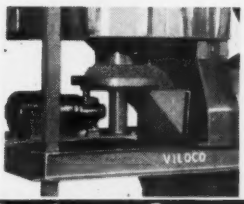

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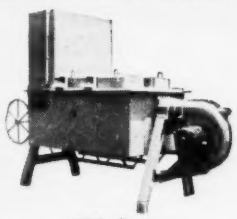

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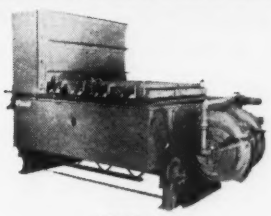

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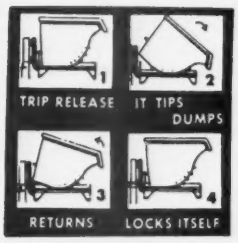

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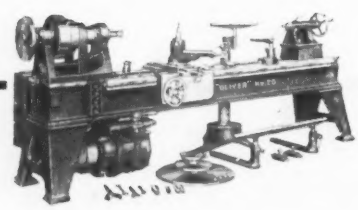

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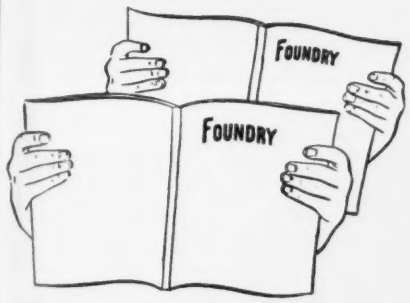

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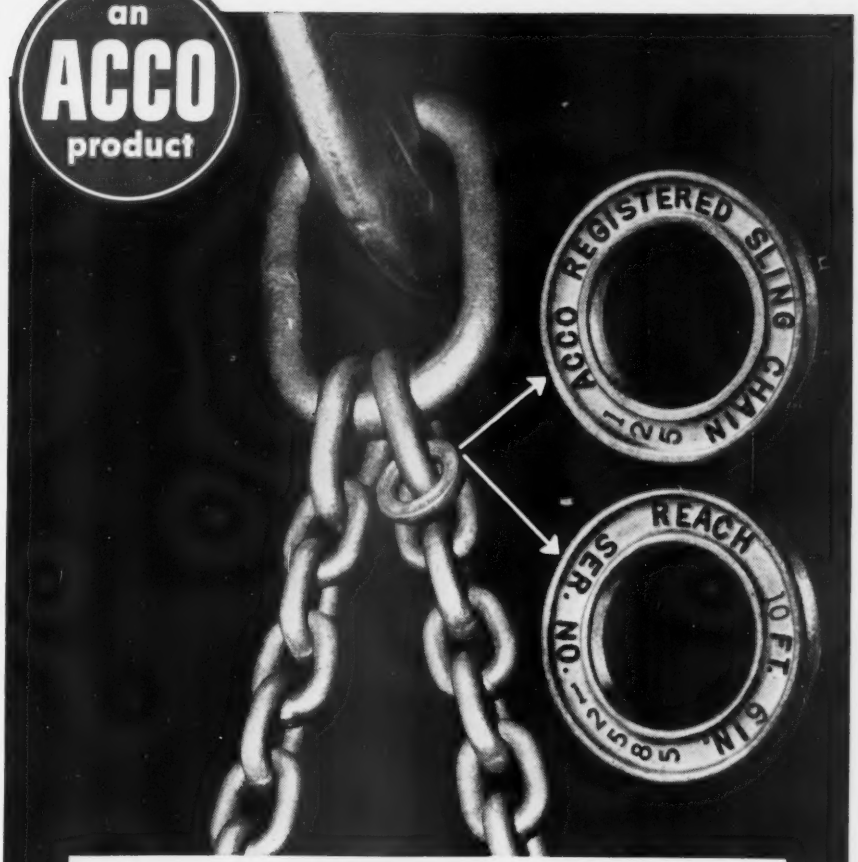

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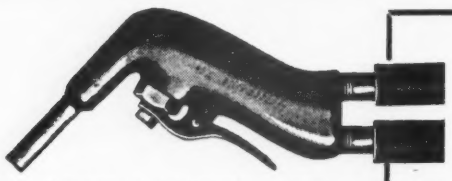
Eliminate—SWABS . . BRUSHES SPRAY CANS with the MURPHY PISTOL SPRAYER



OVER A MILLION SOLD TO DATE

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HAMILTON SPRAY GUN

Complete with 4½ ft. suction hose and sinker . . . **$10.00 F.O.B.** Hamilton, O. *For spraying molds and cores with any liquid. For cleaning motors and machinery. For laying dust. Trigger control. Well made and guaranteed.*

The MURPHY PISTOL SPRAYER shoots blackening into hidden pockets beyond the reach of swabs. Jobs are completed faster and castings peel better and come cleaner. It is of great value in cleaning permanent molds, for aluminum and other metals as well as for sand blasting. For silica wash, oil, water or any liquid material and as a blow gun for cleaning parts and machinery. We guarantee this sprayer, designed by a practical foundryman . . . Write today!

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PIPE SIZE	1/16"	1/8"	1/4"	3/8"	1/2"
PRICE F. O. B. HAMILTON, O.	$12.00	$12.00	$12.00	$14.50	$18.00

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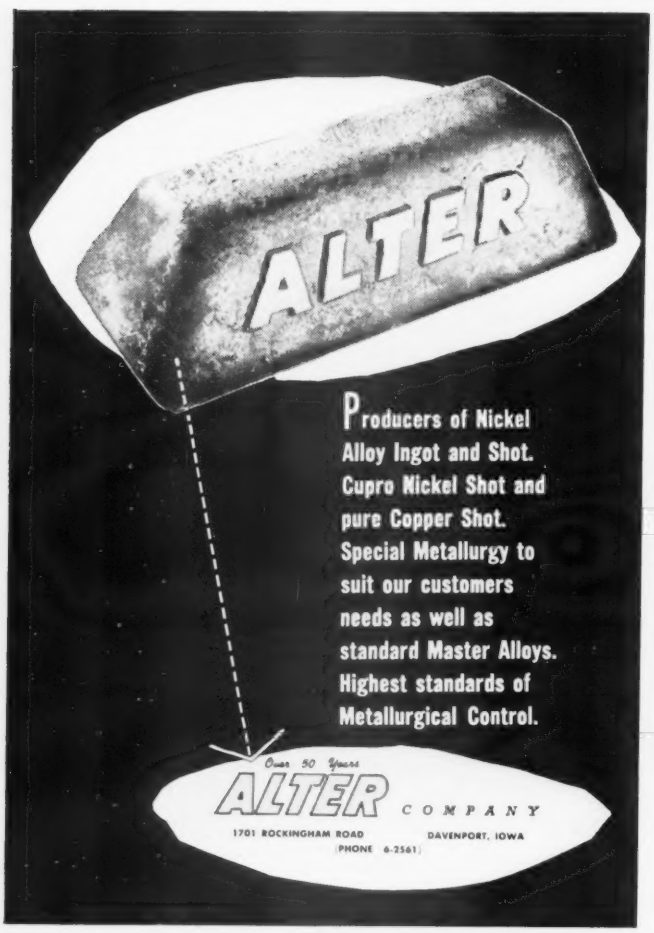
JAS. A. MURPHY & CO., INC.
HAMILTON, OHIO

Moisture Elimination Up To 3000 Pounds Per Square Inch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TELLURIUM

Comes in 1, 2, 3, and 4-gram tablets; also in powder, slabs and sticks. For full information, write Dept. LM for 16-page article on the use of TELLURIUM in chill control.

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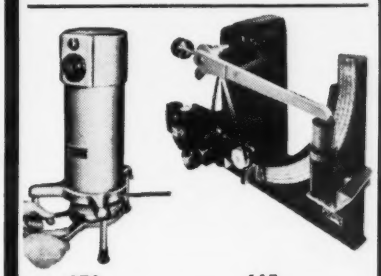
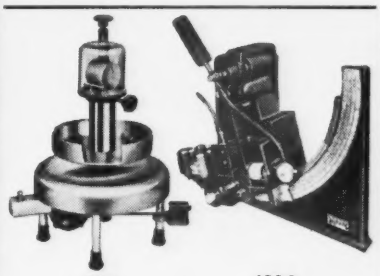
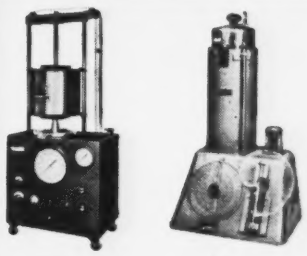
It Pays to Control SAND • CORES • MOLDS

FOR	EASIER MOLDING	EASIER CORE MAKING	BETTER CASTING QUALITY
USE THIS EQUIPMENT	 276 665	 621 420A	 785 335
MAKE THESE TESTS	GREEN STRENGTH GREEN DEFORMATION FLOWABILITY MOISTURE GREEN HARDNESS	GREEN STRENGTH SAG RESISTANCE CRACK RESISTANCE BLOWABILITY STICKINESS	HOT STRENGTH HOT DEFORMATION PERMEABILITY COMBUSTIBLES FINENESS

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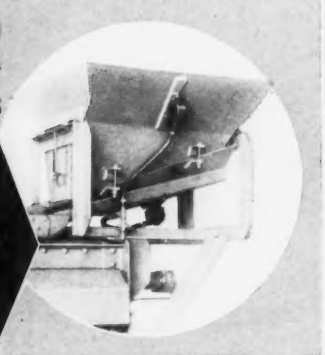
INCREASE CORE BLOWER PRODUCTION

as much as **25%** *with* ***New***

DEMMLER

Vibratory Sand Feeders



The new DEMMLER Vibratory Sand Feeder will increase core production as much as 25%. Sand stored in large hopper flows down sloping chute like running water while vibrators are operating. Sand is delivered in excellent condition for blowing.

- Bucket and Chute Loading Types
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- Comparatively noiseless
- Operates automatically when sand magazine is in filling position
- Low initial and maintenance cost

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FOR NONFERROUS METALS FROM ACME SPECIAL FORMULA

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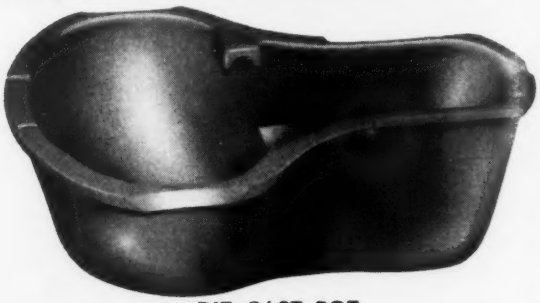
NO. 550A



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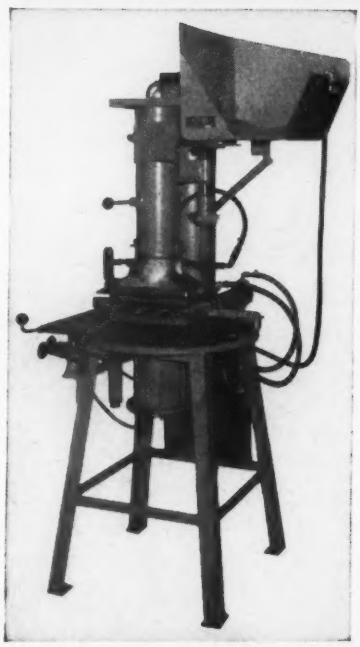

HIGH DRAW MODEL "C-H-E"
Cores up to 15 lbs.

With the operation of one lever on the hand machine, or pushing of one button on the electric cycle, this machine will —Close the Core Box—Blow the Cores—Vibrate the Box—Draw the Cores—and Eject the Core Box to position where the dryer is applied. Produces more cores with less operator fatigue, and more cores per hour.

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Let us figure on your requirements.

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- AMASTEEL assures the lowest cleaning cost.
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Our laboratories have developed a line of special dyes in a range of colors that have been carefully tested and found suitable as well as economical.

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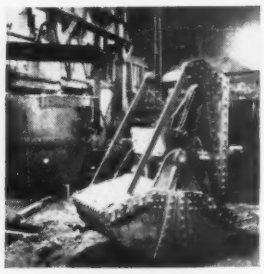
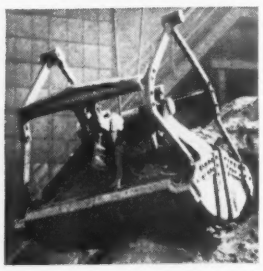
These Four BLAW-KNOX *Buckets*
Help Solve Your Rehandling Problems for Average or Unusual Conditions

FOR AVERAGE HEADROOM



THERE is a type and size of Blaw-Knox Single-Line Hook-On Foundry Buckets to meet a wide range of operating conditions. Blaw-Knox can best give you the competent engineering service that makes possible selection of the bucket suited to your needs.

FOR EXTREMELY LOW HEADROOM

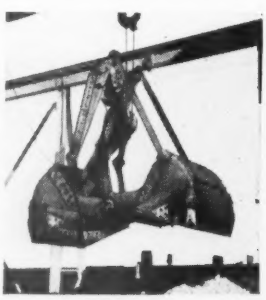


THIS Single-Line Hook-On Bucket solves rehandling problems when headroom is extremely limited. The ¾ yd. capacity bucket requires only 6'7" operating headroom. Also available in larger sizes.

FOR COKE AND SAND
"Shark Tooth" Single-Line Hook-On Buckets

HERE'S the answer to the problem of handling coke and sand . . . simply by adding or removing liner plates, the *same* dual purpose Blaw-Knox Bucket handles both, with minimum degradation of coke and without sand leakage! The illustration at the upper right shows an open head type Single-Line Hook-On Bucket, rated 1 cubic yard, with liner plates applied inside of the shark teeth for handling sand, coal, small limestone and granular fines. Illustrated at the right is a closed head type 1 cubic yard Shark Tooth Bucket without liner plates for coke handling.

Blaw-Knox Shark Tooth Buckets are available in a wide range of sizes and for different headroom conditions.



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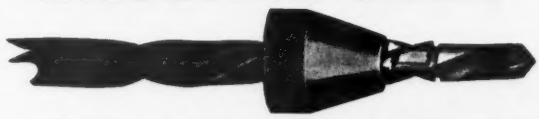
FOUNDRY BUCKETS

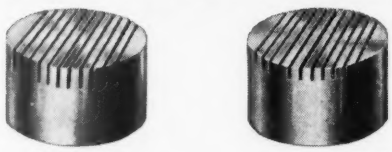
SERVING YOU
in
"Core Blowing Operations"

INSERTING DRILL



• Uniformity of holes • Faster insertion of vent • Correct Depth

CORE BOX VENTS



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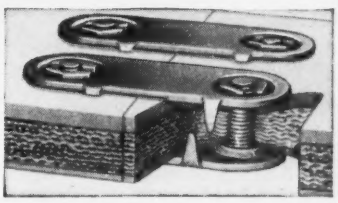
FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH



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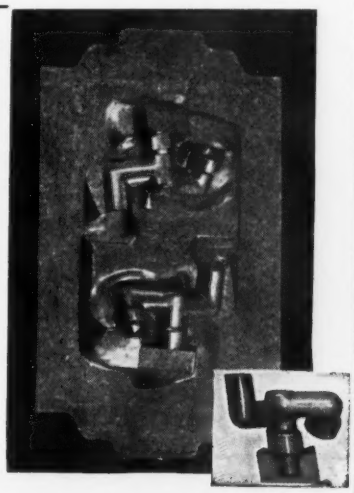

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Pressure-Cast MATCHPLATES
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REDUCE SULPHUR CLEANSE IRON

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Soda Briquette shapes shown here are about 2½ times actual size.

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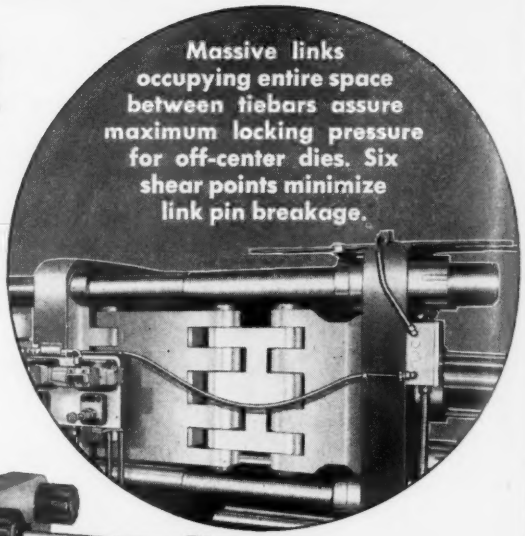

Massive links occupying entire space between tiebars assure maximum locking pressure for off-center dies. Six shear points minimize link pin breakage.

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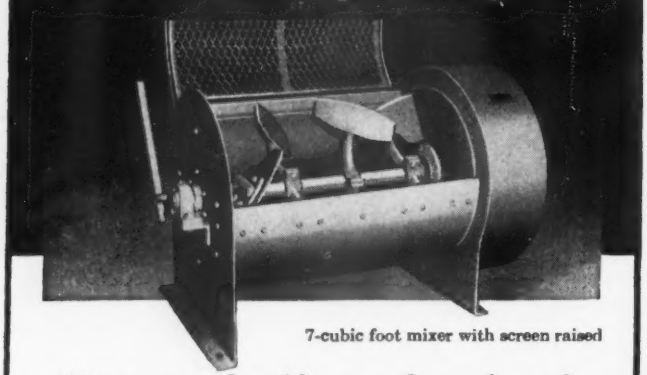

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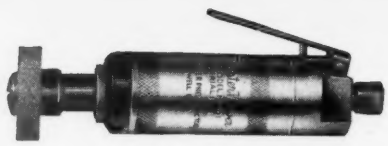

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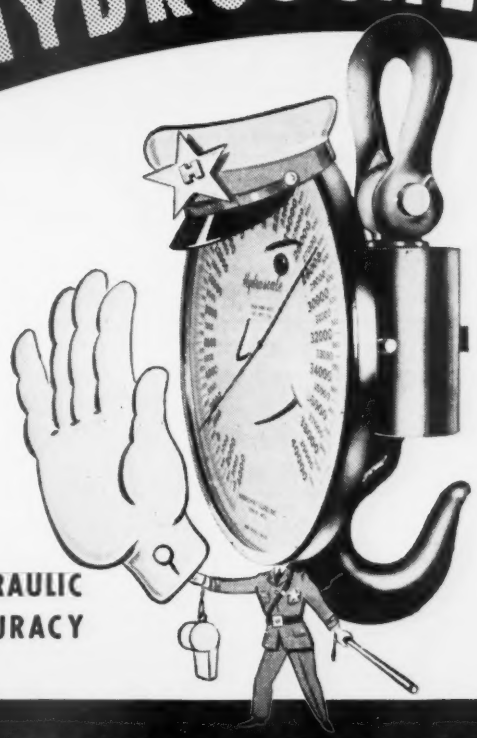
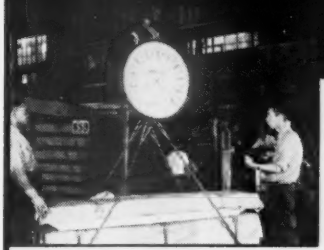


HYDRAULIC ACCURACY

A RUGGED—COMPACT CRANE SCALE THAT PROTECTS YOU AGAINST LOSS!



● **IN RECEIVING**
Check incoming weights at the dock without delay and extra handling.

● **IN INVENTORY**
Avoid transporting heavy bulky material to weighing stations. Speed up the job.

● **IN PRODUCTION**
Prevent overloading equipment. Batch and measure accurately. Foundries load ladles with even mold pours.

● **IN INSPECTION**
Scale can be incorporated in tension and load-pulling test equipment.

● **IN SHIPPING**
Check parts going out for sub contract work and final shipping weights.

No tie-up of men and equipment common to central weighing station layout. Weighs instantly as you lift the load to move it! Models 500 to 100,000 lbs. Dials 12", 24" and 30". Kilogram dials and other special designs for special work . . . Write for catalog.

HYDROWAY SCALES, INC.
2C630 W.8 Mile Rd., P.O. Box 4754, Detroit 19, Mich.

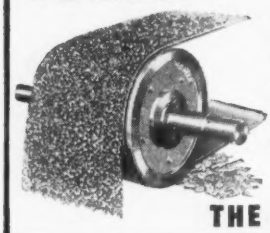
FOR SAND SLINGERS, CONDITIONERS AND CONVEYORS . .

HERE IS THE ANSWER TO YOUR MAGNETIC SEPARATOR JOBS!

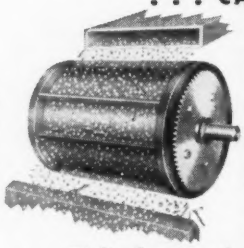
HOMER "Power-Plus" Magnetic Separators

Permanent non-electric—Unaffected by Heat, Cold, Moisture

. . . CAN BE USED INSIDE or OUTSIDE PLANT . . .



Homer MAGNETIC PULLEYS and UNITS —Available in standard diameters from 12" to 30"; belt widths 4" to 60". Special sizes upon order.



Homer MAGNETIC DRUMS—Available in standard diameters from 12" to 30"; face widths 4" to 60". Can be furnished with or without enclosure.

Homer MAGNETIC PLATES—Available in standard widths from 4" to 26"; lengths and number of poles as required. Special fabrications to your specifications.

Write for descriptive bulletins

THE HOMER MANUFACTURING CO., INC., DEPT. 156, LIMA, OHIO

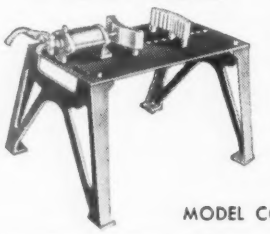
JOY CASTING GRIP DOUBLES YOUR CAPACITY FOR SNAGGING AND CLEANING

- FASTER
- EASIER
- SAFER

WITH

AIR POWERED JAWS

GRIPS FIRMLY ANY SHAPE OF MEDIUM SIZE CASTING 2 TO 20 INCHES



MODEL CG-2

Now . . . the operator can clean and snag twice as many castings because no time is lost trying to get a firm hold on the casting. He can bear down with the grinding wheel because the casting can't fly loose, and he won't lose time if the casting gets hot. Castings are gripped slowly and deliberately, but released instantly by the control of one, easy-to-operate, pneumatic valve. ● Investigate JOY Casting Grips—*you can cut costs with them!*

WRITE FOR CATALOG 76-M

W&D 3664

JOY MANUFACTURING COMPANY

OLIVER BUILDING • PITTSBURGH 22, PA.

ONCE AND FOR ALL . . . STOP PATTERNS FROM STICKING!

Patterns come clean from the sand to make a perfect mold when they're coated with CO-LOIDAL-AC Lacquer.

This hard, long-lasting finish is being used by more and more foundries as its advantages are discovered. Place a trial order today and see the improvement.

Direct factory-to-you sales makes possible exceptional value. Available in gallons or drums, clear or colors.

WRITE FOR COMPLETE INFORMATION

AMERICAN LACQUER SOLVENTS CO.

Perkiomen Junction, Phoenixville, Pa.

COST CONTROL

WESTOVER ENGINEERS

Westover ENGINEERS

FOUNDRY MANAGEMENT CONSULTANTS

3110 WEST FOND DU LAC AVE., MILWAUKEE 10, WIS.

There is no better time than NOW to review incentives, methods, scheduling, production control and paperwork processes.

POWDERED GLASS

AN EXCELLENT BRASS FLUX

—Economical—

THE BASSICHIS COMPANY

CLEVELAND 13, OHIO

Cast Aluminum MACHINED PATTERN PLATES

Shipped promptly from the World's Largest Stock

All standard flask sizes are carried in stock. All plates are cast with one inch flask margin all around PLUS large, well shaped ears for flask pins and vibrator. Order by flask size, not plate size. It will pay you to investigate this source for quality plates

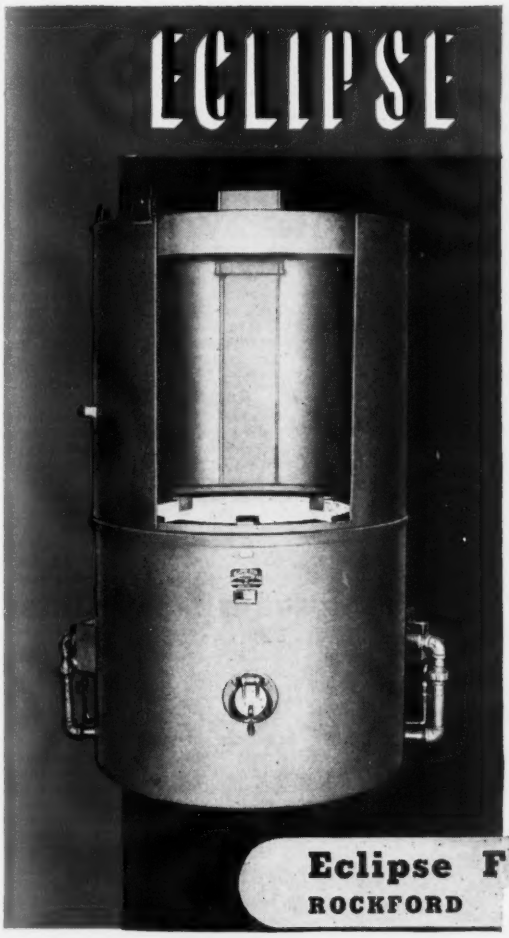
Some Typical Prices for ⅜" Plates . . . Add 33 1/3% For ½"

10 x 16 . . . 9.90	11 x 18 . . . 11.22	12 x 18 . . . 11.88	14 x 16 . . . 12.18
10 x 18 . . . 10.56	12 x 14 . . . 10.26	13 x 16 . . . 11.58	14 x 18 . . . 14.52
11 x 16 . . . 10.26	12 x 16 . . . 10.86	14 x 14 . . . 11.22	16 x 16 . . . 14.52

Send for Price List Today—Special Shapes and Thicknesses to Order

ARTHUR E. WILL, 643 West 11th Street, **ERIE, PA.**

ECLIPSE MELTING FURNACES



DESIGNED ESPECIALLY FOR DIE CASTING

Known and respected wherever the melting of tin, lead, zinc, aluminum or magnesium alloy is required, Eclipse Melting Furnaces are favorites in the die casting field.

Furnaces can be furnished with cast iron, steel, chrome coated steel, or alloy iron, depending on the metal to be melted.

Furnace setting is lined with 4½" first quality firebrick and 2½" block insulation. Refractory bottom is tapered toward run out opening.

Gas fired flame retention-type burners with preburned tuyere blocks and continuous burning pilots locate heat at points of maximum heat transfer.

The McKee Low Pressure Proportional Mixer provides proper Air-Gas ratio at all times. The result is high production and low maintenance costs.

All furnaces can be equipped with roll around door type hoods and removable covers for easy accessibility of pot replacement. Write us for Bulletin C-1A.

Representatives in principal cities.

The Eclipse SM-22 Melting Furnace (at left), with a pot size 22½ by 14¼ inches, has a pot capacity as follows: tin, 1100 lbs.; lead, 1800 lbs.; zinc, 1170 lbs.; aluminum, 440 lbs. Other sizes available, both larger and smaller.

R-2178RR

Eclipse Fuel Engineering Company
ROCKFORD 1125 BUCHANAN STREET ILLINOIS

McKee Eclipse

WELLMAN
Williams Type

INSTANT "ON-AND-OFF" SERVICE ANYWHERE

The Wellman "Hook-on", single-line bucket is designed to provide clamshell bucket service at any crane hook where suitable head room and hoist capacity are available.

Hook the yoke over the crane hook and the bucket is ready for work. When the job is finished, take the yoke off the hook and the crane is free for other duties.

Capacities from ⅜ to 2 cubic yards. Write for free bulletin.

THE WELLMAN ENGINEERING CO. 7019 CENTRAL AVE. CLEVELAND 4, OHIO

CLEANING STARS

A special metal has been developed for this star to guarantee a lower cleaning cost because of its resistance to abrasion.

Foundrymen using these stars say they outlast all other stars they have previously used.

Cut your cleaning costs by ordering a trial lot now

QUINCY FOUNDRY INC.
★ QUINCY, OHIO ★

TRY IT AND SEE
A BETTER RADIATOR CHAPLET
OPEN HEAD

Due to its patented Open Head design, the Cleveland Coil head Radiator Chaplet ensures more rigid and dependable support for cores. ***Sand packs sounder under head and around stem.***

Patented

CLEVELAND CHAPLET & MFG. CO.
26470 Lakeland Blvd., Euclid, Ohio
P. O. Box 5877, Cleveland, Ohio

WRITE FOR BULLETIN showing this and other types of Cleveland Chaplets.

CLEVELAND *Chaplets*

CLASSIFIED ADVERTISING

Help Wanted

STEEL FOUNDRY MEN

Opportunities for the following men in a large steel foundry:

Experienced Unit Foremen for
Melted Metals Dept
Foundry
Core Room
C.F.&A.
Inspection
Pattern

Also openings for engineers and draftsmen. Government owned defense plant in Chicago area to be operated on armor steel castings. Company operating set-up sufficiently large and aggressive to afford permanent opportunity to men whose performance proves to be outstanding.

BOX 742
FOUNDRY CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

For plant pouring approximately 25 tons per day, about one half jobbing and balance semi production ranging in weight from 1 oz. to 2000 lbs. We believe this is an excellent opportunity for a really good foundryman who knows his business and who has the ability to maintain good employee relations. When replying please detail your foundry experience, metallurgist experience, if any, age, marital status and salary desired. Replies will be kept strictly confidential. Address: Box 789, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Age 35 to 45, aggressive, well balanced and who really knows his job for medium size gray iron foundry on light to medium heavy castings. Central New York, good opportunity for advancement to right man. Address: Box 801, FOUNDRY, Cleveland 13, Ohio.

WANTED

Man to take complete charge of all operations in the Steel Foundry Department of a large foundry. Opportunity for advancement with long established company. Write stating full qualifications and experience. All replies held confidential. Address: PERSONNEL MANAGER, THE EASTERN MALLEABLE IRON COMPANY, P.O. BOX 349, WILMINGTON 99, DELAWARE.

DEPARTMENT HEADS
STEEL FOUNDRYMEN

Opportunities for department heads in a large steel foundry.
Department heads needed in:
Molding
Core
CF&A
Government owned defense plant in Chicago area operating on armor steel castings. Company operating set-up sufficiently large and aggressive to afford permanent opportunity to men whose performance proves to be outstanding.

BOX 821
FOUNDRY CLEVELAND 13, OHIO

SUPERVISOR FOR MECHANIZED FOUNDRY

Old established eastern iron foundry completely mechanized running jobbing work of medium size requires supervisor thoroughly experienced in continuous pouring, multiple conveyor operation. Squeezer, stripper and rollover machines, high production. Excellent opportunity for man who is a leader. Reply giving age and experience. Address: Box 792, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Grey iron, Western Michigan — squeezer and light floor work. Must be ingenious, practical and production minded. Give experience, age, references and starting salary in reply. Address: Box 810, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

CASTING SALESMEN

Experienced salesmen for brass, bronze and aluminum production castings needed in the St. Louis, Chicago and Kansas City areas. This company is at present expanding its production facilities for rollover type production work. Give detailed information as to background and sales experience. Commission basis. Reply confidential.

BOX 752
FOUNDRY CLEVELAND 13, OHIO

EXPERIENCED STEEL FOUNDRYMAN

Opportunity for an experienced man to stabilize and help guide a young, aggressive steel foundry organization. Should have experience in melting, molding, core making and cleaning and should be capable of smoothing out rough spots in any phase of foundry work. Age not important. Address: Box 795, FOUNDRY, Cleveland 13, Ohio.

MOLDING FOREMAN

Jobbing steel foundry Eastern Penna. Must have experience all types machine molding and sand-slinger and be able to handle men. Excellent opportunity advancement. Salary commensurate with ability. Address: Box 816, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Experience in steel jobbing work essential. Must be able to follow production schedules. Supervise production by machines and coreblowers all cores. Modern foundry Eastern Penna. Salary and bonus commensurate with ability. Address: Box 815, FOUNDRY, Cleveland 13, Ohio.

ACID ELECTRIC MELTER

For Steel Foundry. Write, giving experience, age, salary desired. Foundry located in East. Address: Box 818, FOUNDRY, Cleveland 13, Ohio.

SAND CONTROL

Large mechanized eastern foundry requires experienced sand control man. Experience required on both natural and synthetic sands. Reply state age and experience. Address: 823, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Opening for Foundry Metallurgist in modern steel foundry Eastern Penna. Practical foundry background desirable but not necessary. Excellent opportunity for advancement. Address: Box 814, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY CLIENTELE

Excellent opportunity for men acquainted with the foundry industry in Eastern, Southern and Western United States. Have attractive proposition for those capable of producing core oil business in these areas. Write direct, or contact:
MR. BODMAN
BOOTH 339, A.F.S. CONVENTION, ATLANTIC CITY.
MAGIE BROTHERS, INC.
1640 CARROLL AVE. CHICAGO 12, ILLINOIS

SALESMAN WANTED

Sand castings—Brass—Bronze—Aluminum. Only experienced man with definite contacts need apply.

HALL FOUNDRIES
EXECUTIVE OFFICES—100 WEST 52ND ST.
NEW YORK CITY
TELEPHONE CIRCLE 7-1675
FOUNDRY—BRIDGETON, N. J.
TELEPHONE 9-1091

SALESMEN WANTED

Aluminum foundry located in Northern Ohio desires services of manufacturer's representative to solicit sub-contract work for aluminum sand castings. Address: Box 822, FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY PERSONNEL

Eastern steel foundry under new expansion plan has openings in plant supervision and for key personnel in foundry, cleaning, metallurgical, inspection, plant and methods engineering departments. Address all inquiries, stating experience, background, age, marital status and salary expected. Box 833, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

SALESMAN

Experienced—to call on foundries in sections of Ohio, Pennsylvania and New York State selling refractories and fire clay. Necessary to live in vicinity of Youngstown, Ohio. Give full particulars and experience. Address: Box 829, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Applicant must have proven experience in the sale of nonferrous metals. Metallurgical degree or equivalent knowledge helpful. Adaptability to our technical and sales policies will be necessary. Prefer applicant between 25-35 years. Willing to travel. A complete resume of education and work record, including a recent photograph is requested. Location: Great Lakes Area.

BOX 837
FOUNDRY CLEVELAND 13, OHIO

Representative Wanted

METALS, MINERALS & CHEMICALS

Salesman for exclusive territory on commission basis. Write full and complete personal and sales data in confidence. Include small photo map, etc. Address: BRAM CHEMICAL CO., 820—65TH AVE., PHILADELPHIA 26, PA.

IRON FOUNDRY REPRESENTATIVE

Iron foundry of established high standing located in the east desires the services of an experienced sales representative for New York City and vicinity on a commission basis with a permanent arrangement opportunity. Address: Box 827, FOUNDRY, Cleveland 13, Ohio.

REPRESENTATIVE WANTED

Centrally located nonferrous foundry looks for live wire representative for Michigan, Indiana, and Eastern Pennsylvania.

BOX 844
FOUNDRY CLEVELAND 13, OHIO.

FOUNDRY REPRESENTATIVE

Midwest aluminum and bronze sand foundry producing commercial and government quality castings has increased capacity which is available for well-rated firms. Territories open to right party on commission basis. Address: Box 847, FOUNDRY, Cleveland 13, Ohio.

WANTED

Representatives for line of turbo blowers especially designed for foundries. ADDRESS: BOX 750 FOUNDRY, CLEVELAND 13, OHIO.

Engineering Service

FOUNDRY PROBLEMS SOLVED

"Specialist" in
Quality control. .gating. .risering. .porosity problems and x-ray technique. Synthetic or natural molding sand formulas.

E. MERIDETH HUNT
FOUNDRY SALES & ENGINEERING CO., INC.
1006-7 PONTIAC STATE BANK BUILDING
PONTIAC, MICHIGAN
FEDERAL 4-4508

Positions Wanted

FOUNDRY EXECUTIVE
(MANAGER—SUPERINTENDENT)

Mature foundry executive with well-developed talent for organization and plant operation (handles men especially well) available soon for greater responsibility and opportunity. Under 50, mechanical engineering graduate with broad experience as foundry manager, superintendent, industrial engineer (has managed rebuilding and building of foundry organizations). Experience includes foundry sales operations. Resourceful, energetic, cooperative and stable. Address: Box 845, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Practical gray iron foundryman, molder by trade, technically trained, graduate metallurgist. Broad background of experience in general jobbing and high production of quality castings. Well versed in all phases of the foundry. Dry and green sand, pit and machine molding, cores, cupola, metal control. Wants connection with progressive foundry needing real foundryman to produce required results. Address: Box 825, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FIFTY-SIX

Years of age. Too old for foundrywork? Knowledge and experience are functions of time and environment. Are you in need of those qualities? If in the affirmative your response is invited by an academically trained metallurgist who has spent 26 years in the sands of grey iron, malleable iron and red brass foundries but kept his mind clear and young and who seeks employment by a well established foundry where quality counts and economy is the watchword. Address: Box 831, FOUNDRY, Cleveland 13, Ohio.

FOREMAN OR SUPERINTENDENT

Practical gray iron foundryman molder by trade experienced in general jobbing and quality semi steel and alloyed castings. Well versed in green—dry and pit work. Well experienced in cupola practice, bumper and squeezer work. Available about April 1st. Address: Box 807, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT—METALLURGIST

Experienced in molding and core room foundry practice, acid and basic steel melting high alloys, laboratory controls, desires position in electric steel foundry. Address: Box 812, FOUNDRY, Cleveland 13, Ohio.

PRACTICAL—TECHNICAL

Gray iron foundryman, age 48, molder by trade, graduate metallurgist. Outstanding background of experience and ability in highly mechanized high production foundry using most modern equipment and methods. Well versed in slingers, jolts, squeezers, blowers, sand control, continuous pouring etc. Works from blue prints. Cost minded. Wants connection with sound firm needing services of high grade foundryman to get results. Address: Box 826, FOUNDRY, Cleveland 13, Ohio.

CHEMIST—ANALYST

Experienced chemist and accurate analyst. Ferrous and nonferrous, especially magnesium, particularly where spectrographic equipment is not available. Trace amounts a specialty. Address: Box 846, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Capable working foreman, both wood and metal and plaster pattern work. Middle age first class mechanic. Estimate work and complete in shop. Can teach apprentice help. Address: Box 842, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Wood metal work including precision cast matchplates and pattern work in aluminum, brass or iron. Have about 40 years in above work and foundry trouble shooting on pattern equipment. Address: Box 843, FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRYMAN

Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 603, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Wide experience in all phases of management to take charge of small foundry, gray iron, brass, large or small castings, jobbing or production. Well versed in scrap control. Salary or salary and profit plan. Address: Box 839, FOUNDRY, Cleveland 13, Ohio.

PRECISION CASTINGS

Precision casting match plates, core boxes and castings. Can set up shop and run as paying department in plant. Capable patternmaker. Have most equipment to operate shop. Address: Box 841, FOUNDRY, Cleveland 13, Ohio.

METALLURGICAL ENGINEER

Capable steel foundry metallurgist desires position. Experienced, finest references, outstanding background. Now employed, M.S. degree. Address: Box 798, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT

Experienced in gray iron and some nonferrous on both production or jobbing basis. Exceptional background of practical and technical training. Cost minded and have the best in references. Eighteen years of executive background. Address: Box 707, FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY EXECUTIVE

Can take complete charge of all foundry operations, small, medium or large or act as technical advisor to the chief executive. Education and experience data on request. Now employed. Address: Box 838, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

MECHANICAL ENGINEER

B.S. degree, 27, family, three years' engineering experience in grey iron foundry. Desire position with greater responsibility. Thorough knowledge of all phases of foundry industry. Desire location in East, preferably in Philadelphia vicinity. References. Address: Box 836, FOUNDRY, Cleveland 13, Ohio.

EXECUTIVE POSITION

Desired by young family man. Sound scholastical and practical background. Working knowledge of economics, production, sales and human relations. Experienced in molding, melting, sand and laboratory in both worker and supervisory capacity. Previously technical advisor and now sales representative for large midwest foundry. Interested in managing a medium sized foundry or Jr. executive in large corporation. Must give 30 days' notice. Address: Box 786, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Looking ahead? So am I. Good man for good company. Record—I make profits. Experience—25 years' practical, technical, administrative. Age 42, now employed. Address: 797, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT

A top notch foundryman with twenty-one years' experience in all phases of foundry work. Desires position as manager or superintendent in medium to large company, jobbing or production, alloy, semi-steel and gray iron. Now employed, available on short notice. Address: Box 726, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Fifty-seven years of age with thirty-five years' experience in iron, brass and aluminum foundry work. Free to travel and would like to invest small amount of money in a worthwhile proposition. Also experienced in running foundry. Address: Box 813, FOUNDRY, Cleveland 13, Ohio.

JR. METALLURGIST

B.S. Metallurgical Engineer. One year experience ferrous foundry—manufacturing research on nodular iron and shell molding using electric furnace. Two summers as student engineer on ferrous cupola. Desire position with West Coast Firm. Address: Box 820, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Desires position as superintendent or foreman, gray iron or nonferrous. Practical man with 26 years' jobbing and production experience. Soil pipe and fittings and farms machinery included. Address: Box 785, FOUNDRY, Cleveland 13, Ohio.

MANAGER—ASSISTANT TO PRESIDENT

Steel, iron, brass. Thoroughly experienced in every shop operation, metallurgy, engineering, accounting and management. Excellent ability to develop a superior organization by leading, teaching and example. Outstanding reputation for keen analysis, sound judgment and a rare combination of practical experience, managerial ability and effective personality. Address: Box 375, FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS

$3,500 to $35,000. We offer the original personal employment service (established 42 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. Address: R. W. BIXBY, INC., 101 DUN BUILDING, BUFFALO 2, NEW YORK.

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Available Capacity

GRAY IRON FOUNDRY
AVAILABLE CAPACITY

We have open capacity in two foundries enabling us to supply both light and medium heavy gray iron castings of high quality. One is a highly mechanized, high speed production foundry capable of producing large volumes of light and medium castings and the other produces castings up to 1000 pounds. Address: Burnham Corporation, Zanesville, Ohio.

IMMEDIATE CAPACITY AVAILABLE

For semi-steel castings, pressure type as well as usual run of work. Quantity runs of 100-500 lbs. castings. Jobbing lots of castings 500 to 10,000 lbs. Address: DARLING VALVE & MFG. CO., WILLIAMSPORT, PA.

AVAILABLE CAPACITY

Pattern shop complete service, prompt delivery on first class work. Location, Michigan. Some open capacity. Address: Box 840, FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED TO BUY

Steel Apron Conveyor for hot castings, 18", 20", 24" or 30" wide.
Pottstown Tapping Machines.
2—16" Cyl. Jolt Squeeze Stripper Molding Machines
1—14" Cyl. Rollover Molding Machine
STEEL FLASK EQUIPMENT
18—14 x 16 6" Drag 4" Cope
18—12 x 18 6" Drag 4" Cope
24—12 x 23 6" Drag 4" Cope
18—14 x 20 7" Drag 7" Cope
12—16 x 16 6" Drag 6" Cope
12—18 x 18 6" Drag 9" Cope
24—18 x 18 6" Drag 6" Cope
24—24 x 24 7" Drag 7" Cope
18—16 x 26 6" Drag 6" Cope
12—30 x 30 5" Drag 7" Cope
NATIONAL FOUNDRY COMPANY OF NEW YORK, INC.
2-56 SANDFORD ST. BROOKLYN 5, NEW YORK

WANTED

100-250 KW H.F. Induction Furnace.

Write full details to:

BOX 2188

UNIVERSITY OF ALABAMA

TUSCALOOSA, ALA.

WANTED

Marschke swing frame grinder, 7½ HP with or without hoist and trolley. Address: FLEMING FOUNDRY COMPANY, 164 BIRNIE AVE., SPRINGFIELD, MASS.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

WANTED

One used screenerator and one mullbarrow, used. Address: GRUBBS FOUNDRY, 4700 ROSA ST., EL PASO, TEXAS.

WANTED
CORE GRINDER

1—Used No. 70 Milwaukee Foundry Equipment Co. 43. 72" table, 30" grinding wheel. Address: FRANK FOUNDRIES CORP., 1324 S. BROTHERTON ST., MUNCIE, INDIANA.

CLASSIFIED ADVERTISING

Wanted-To-Buy

WANTED

Need for production—Simpson Mixer, Raymond Mill, one or two vibrating screens. Please give full particulars. P. O. BOX 1351 CHURCH STATION, NEW YORK 8, N. Y.

WANTED

One used mullbarrow, one stationary sand slinger, one used in-a-door wheelabrator or revolving table wheelabrator. Address: GRUBBS FOUNDRY, 4700 ROSA ST., EL PASO, TEXAS.

WANTED

SANDSLINGER WANTED—Junior Tractor. Address Box 656, FOUNDRY, Cleveland 13, Ohio.

WANTED

Number 2 Simpson Mill. Advise price, condition and where same can be inspected. Address: W. E. MACMULLAN, WELLSVILLE, MO.

WANTED

BRIDGE CRANES

ARNOLD HUGHES COMPANY

765 PENOBSCOT BLDG. DETROIT 26, MICH.

WOODWARD 1-1894

Foundries For Sale

FOR SALE

Modern nonferrous foundry, sand system, 6 molding positions, 5 core making, 5 tilting furnaces. Good accounts, sales $274,000 1950. Can be raised to $500,000. Price $65,000. Will give lease on building 60 x 150 ft. to suit buyer with option to buy. Principals only. San Francisco, California Bay district. Contact owner, Box 809, FOUNDRY, Cleveland 13, Ohio.

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

FOUNDRY—GRAY IRON

Located southern Ill. town. Pop. over 10,000. Water and railroad transportation available. Labor plentiful. Foundry with 2 clear spaces 80x320, with overhead monorail. Has 2 No. 7 Whiting cupolas 72" in diameter. Contains equip. ideal for mechanized oper. Address: Box 358, FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRY

Small but fully equipped in Peru, Indiana. Established 22 years specializing in high grade brass, bronze and aluminum castings, etc. Three oil-fired melting furnaces, ovens, full line of machinery, tools, etc. No debts but owner must sell due to death of manager. A going concern with all that is necessary for operation. Write: RHODES & RHODES, ATTORNEYS, PERU, INDIANA.

FOUNDRY FOR SALE

Well equipped foundry. Main building about 150 x 150. 36" cupola. Prompt possession. Priced right. Terms can be arranged. Located in Sanford, North Carolina. Write for further information to:

BOX 628

SANFORD NORTH CAROLINA

FOR SALE

Well equipped gray iron foundry and machine shop in the center of North Dakota's oil boom. One of the greatest opportunities in the North West. Under the same management for fifteen years. Reason for selling—ill health. Call or write: MINOT FOUNDRY CO., MINOT, NORTH DAKOTA.

FOR SALE

Established going grey iron foundry ,fully equipped. Power squeezer and small floor work. Buildings and land—price $45,000. Located in Wisconsin, town population 10,000. Address: Box 796, FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

GRAY IRON FOUNDRY

Well established small manufacturer in Mid-West Mfg. city wishes to sell, going jobbing foundry. Modern equipment for squeezer and floor molding. Will sell or lease real estate. Seller will continue to need castings. Good opportunity for the right buyer.

BOX 765

FOUNDRY CLEVELAND 13, OHIO

For Sale

FOR SALE

3—Tilting Swing Head cover brass furnaces, No. 300 crucible.
1—Pedestal Grinder with 5 HP. Motor.
1—Covered Worm Geared Ladle, 1000 lb. cap., made by Modern Equip. Co.
1—Whiting Slag Ladle
1—Worm Geared Covered Ladle, 400 to 600 lb. for Pouring Device.
1—10 Ton Whiting Worm Gear Ladle
2—1000 lb. Worm Gear Ladles
2—2 Ton Worm Gear Ladles.
1—6 Ton Worm Gear Ladle
1—7 Ton Worm Gear Ladle
1—Blystone Sand Mixer complete with motor, gear driven.
1—JFL International Power Jolt Foot Lift Machine.
1—JDP. International Jolt Stripper, 600 x 8
2—International "G" Machines 20 x 8
1—Osborn Bumper 24 x 36
1—International Jolt Squeezer
1—International "R" Type 14 x 8 Machine
2—24" Elec. Riddles.
2—Gyratory Elec. Riddles.
1—American Sand Cutter Machine Size 89/70 M.
1—Sprue Cutter with 2HP. Motor.
1—24 x 54 Sly Tumbling Mill.
1—36 x 54 Late Model Whiting Tumbling Barrel complete with Jones Speed Reducer & 7½ HP. Motor.
1—Jeffrey Sand Conditioner.
1—Royer Sand Conditioner.
1—Wells Metal Band Saw Type 9M42.
1—General Blower, 3 HP. Motor, 16 oz. pressure, 220 or 440, 3 phase, 60 cycle, 375 CFM.
14 Set-Truscon Pressed Steel Flasks, 19 x 20, 8 Cope, 8 Drag.
89 Set-Truscon Pressed Steel Flasks, 15 x 20, 8 Cope, 3 Drag.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

FOR SALE

Stroman furnace 1000 lb. copper oil or gas, motorized tilting mechanism.
Air compressor 50 HP, 210 CFM.
Electric hanging sand riddle.
All excellent condition. Reasonable.
Call or write:

PRINTING PLATE SUPPLY CO.
432 S. DEARBORN ST. CHICAGO 4, ILL.

FOR SALE

Precision investment casting equipment. Will handle both ferrous and nonferrous.
2 Detroit carbon arc furnaces
Westinghouse Electric furnace with heat treating controls—maximum 1800 degree F
Despatch Electric oven—maximum 600 degree F
Complete vacuum pump
Electrical controls
Wax injectors and other items
WILL SELL IN WHOLE OR IN PART

MARSON CORP.
REVERE, MASS. RE. 8-4398

FOR SALE

1—International type PK Jolt Squeeze Pin Lift 18" cylinder, 8" lift
1—International Plain Jolt—18" x 24" Table
1—Champion Core Roll-over, 16" x 8", Portable
1—1-ton Gear Ladle
1—3 HP Stand Grinder
1—2-ton Lo-Hed Hoist, 220 V., D.C.

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

For Sale

FOR SALE

1—NEWAYGO HANDY SANDY — REDDY SANDY
2—ROYERS NB-2, Pneumatic Tires.
2—EDISON ELECTRIC CORE OVENS, 6 Drawers
2—7½ HP HAMMOND HEAVY DUTY GRINDERS
3—OSBORN #142 Jolt Rollovers
16—SPO & 275-J OSBORN Cantilever Type, Jolt Squeeze MOLDING MACHINES
JOHNSON & JENNINGS Portable Rollovers, #815-B—610-B
SAND CUTTERS, Models F—M—D
MOLDERS FRIEND and extra brush
TUMBLING BARRELS
HEAVY DUTY ROLLER CONVEYOR, 12"—30".
COMPLETE EQUIPMENT FROM IRON FOUNDRY IN VIRGINIA.
Complete nonferrous smelting plant.
2—Hopkins rotary oil fired smelting furnaces
5—Overhead cranes, Hardinge ball mill, etc.

SEND FOR FIVE PAGE LISTING OF RECONDITIONED FOUNDRY EQUIPMENT.

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 EAST BROAD STREET
SHILLINGTON, PENNA.
PHONES—READING 30311—40146
R. B. HARRISON, MANAGER FOUNDRY DEPARTMENT

JOB-PRODUCTION ALLOY FOUNDRY

Having trouble with delivery of new equipment? Here is a modern installation only seven years old and well maintained that is suitable for job or production castings of about 100,000 pounds per month. Included is a Beardsley & Piper #S-490 sandslinger, a #610 Clearfield sand mixer, Schneible roto-clone dust collector, magnetic belt, breaker barrel, elevators, sand bins, roller conveyor, flasks, clamps, etc. All this can be had at a fraction of its 1946 cost. We would prefer to have you remove it as a whole, but all reasonable offers for individual units will be considered. For complete list of items and prices:

BOX 830
FOUNDRY CLEVELAND 13, OHIO

FOR SALE

3 COMPLETE MOLDING UNITS
#1 and #2 consists of:
#70 Speedmuller
Simplicity Shakeout
Slinger head
18Ft. Turntable
Bucket elevators
Belt conveyors
Hopper for overhead sand control
#3 consists of:
Simpson Intensive Muller
Simplicity Shakeout
2 Milwaukee Jolt Squeeze Strip Machines (rail type)
Bucket Elevators
Belt Conveyors
Hoppers

These units may be inspected intact. Detail drawing and complete detail list of units as presently installed furnished on request.

DONOVAN, INCORPORATED
1080 HAZEL AVENUE
ST. PAUL, MINNESOTA
PHONE: VANBUREN 5531

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
4000	32 oz.	Spencer	60	440/3/60	
3500	40 oz.	Spencer	60	440	1800
2700	16 oz.	Spencer	20	220/3/60	1750
650	16 oz.	Spencer	10	220/3/60	3600
450	40 oz.	Spencer	7½	220	1750
400	16 oz.	Spencer	3	220/3/60	3500

PRESSURE BLOWERS (3 Phase, 60 Cycle)

100	7" SP	Spencer	1	110/DC	3500
9100	7" SP	Sturtevant			1900
4500	16 oz.	G. E.	30	440	3600
2700	16 oz.	Nth. Amer.	20	220/440	3600
2500	7 oz.	Sturtevant	15	220/440	1800
1150	20 oz.	North Amer.	10	220/440	3160
400	43 oz.	Spencer	2	220/3/60	3500
800	8 oz.	Nth. Amer.	3	220	3600
660	20 oz.	AllenBillmyre	7½	440	3600
450	6 lb.	A&B	30	220/440	3450
340	20 oz.	AllenBillmyre	3	440	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO

For Sale

FOR SALE

SURPLUS FOUNDRY SUPPLIES

Offered subject to prior sale.

100 N. T.	Foundry Coke—Fines
9	14" x 14" x 8" Deep, 1" Taper—Mold Jackets—New
30 N. T.	Carbonite
60,000	2" x 2" x .014" Perforated Skim Gates
1 N. T.	Ferro Phosphorus
4 N. T.	Granulated Soda Ash
1,000 #	Sil - o - cel
1,000 #	Carbon Paste
4,700	36"-48" Cupola Blocks
1,500	36"-45" Caliau Blocks
5 N. T.	Mexican Graphite Briquettes.
97	Silica Carbide Slag Hole Blocks 4¾" x 5¾" x 6¾" 1¼" Hole

WRITE

NYLEN PRODUCTS COMPANY ST. JOSEPH, MICHIGAN

FOR SALE

Herman Hi-Speed Rollover Machine—1500 lb. series.
Table size 36" x 48" with jarring machine—used very little.
2 International REJ jolt clamp, rollover, squeeze, draw molding machines. 800 lbs. capacity—new in 1946.
24" x 26" International Core Machine.
2—40' Carl Mayer Vertical Tower Core Ovens Used six months.....Price $15,000.00 each
1—Clearfield Sand Mixer—Model 610—New in 1948.
Beardsley & Piper 16' Turntable and 6 Pushoff Machines.

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
TELEPHONE: FAIRMOUNT 1-1186

FOR SALE

MOLDING MACHINES

Two (2) NICHOLLS TYPE 24S-20 HEAVY DUTY SQUEEZER MOLDING MACHINES, practically new. Equipped for complete automatic operation, including Flask Indexing, Automatic Sand Hopper, Strikeoff, Squeeze, Draw and Roll Off Device.
All necessary air cylinders, valves, and electrical controls for above equipment.
Machines will handle flask sizes up to 18" x 30" x 5" cope x 5" drag, with a molding cycle of 15 seconds.

BOX 819
FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1—Whiting lipour crane ladle. Capacity 20,000 lbs. molten nickel. Based on 6" refractory lining. Practically new.

NORTH AMERICAN SMELTING CO.
BOX 1952
WILMINGTON 99, DELAWARE

FOR SALE

Wisconsin nonferrous foundry and manufacturing, 60 miles from Chicago. Have large volume of rated orders. With increase in government expenditures, you should clear this in one year. Price $55,000. Retiring. Address: Box 504, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Three Mercury platform lift trucks—AAA-1 shape. Complete with batteries and battery charger. About one-third new price. Subject to prior sale. Address: INDIANA PRODUCTS COMPANY, BOX 539, KOKOMO, INDIANA.

SOIL PIPE AND FITTING EQUIPMENT

Assorted patterns, arbors, pipe machines and other equipment necessary for the manufacture of soil pipe and soil pipe fittings. Address: J. F. QUEST FOUNDRY CO., 900 S. 4th ST., MINNEAPOLIS 15, MINN.

FOR SALE

SPO #9336 jolt squeeze rollover molding machine and SPO #2134 stationary jolt squeeze cope molding machine, up to 28" pattern. Used little.

THE PROOF COMPANY
936 E. 72nd ST. CLEVELAND 3, OHIO

FOR SALE

USED HOUGH PAYLOADERS HA MODELS WITH HARD RUBBER OR AIR TIRES IN FIRST CLASS MECHANICAL SHAPE, PRICED RIGHT. ADDRESS: CONSTRUCTION EQUIPMENT CORP., 2118 S. 7th ST., ST. LOUIS 4, MO., PHO: SIDNEY 1070.

FOR SALE

Whiting square tumbling mill 30" x 30" x 60". Thickness of plate ¾"; v belt pulley drive; brass bearings. Excellent for medium size castings. Price $300 f.o.b. St. Jerome. Apply: ST. JEROME INDUSTRIES LTD., CASTONGUAY ST. WEST, TEL: 3767, ST. JEROME (TERREBONNE) QUE., CANADA.

MAN COOLERS

Available for immediate delivery. Write, wire, phone:

AMERICAN ELECTRIC CORP.
328 W. COURT ST. INDIANAPOLIS, INDIANA
TEL PL 2833

FOR SALE

Gardner #7 ½-30" single spindle vertical disc grinder, complete with 15 H.P., 1800 R.P.M., totally enclosed, fan-cooled, ball bearing motor with starter and push button station. Following accessories also available:
1—Right-hand universal lever feed table.
1—30" steel wheel, drilled for grinder Wire-Lokt abrasive.
1—Extra Gardner Wire-Lokt abrasive disc-166 grade 3, 30 x 15 x 1-Red Rim.
1—Lever table wheel dresser, ball bearing type.

WOODMANSE MANUFACTURING CO.
210 EAST MAIN STREET FREEPORT, ILL.

FOR SALE

ONE—Type No. 94 Simplex melting furnace—hand operated—for use with No. 2 fuel oil. Capacity 2,000 lbs. in brass complete with form for rammed lining. Very little use. Write for details.

NIAGARA FALLS SMELTING & REFINING DIVISION
CONTINENTAL COPPER & STEEL INDUSTRIES, INC.
2208 ELMWOOD AVENUE
BUFFALO 23, N. Y.

FOR SALE

One Kling High Speed Heavy Duty Stand Grinder Type "NT"—Using 2 24 x 3 x 12 Resinoid Wheels
Complete with 15 H.P. Motor
In excellent condition

PELTON STEEL CASTING COMPANY
148 W. DEWEY PLACE
MILWAUKEE 7, WIS.

FOR SALE

Sand-Blo-delux model core blower, model C-D 40-D. Used very little and in excellent condition.

THE PROOF CO.
936 EAST 72ND ST. CLEVELAND 3, OHIO
SAND BLASTING AND FOUNDRY EQUIPMENT

FOR SALE

37,750 lbs. #10 bright basic wire.
20,000 lbs. #11 black annealed wife.

BOX 832
FOUNDRY CLEVELAND 13, OHIO

FOR SALE

No. 4 U. S. rotary melting furnace complete. Ser. No. 232 capacity 2000 lbs. brass. Practically new. Adaptable for oil or gas firing.

BURNDY ENGINEERING CO., INC.
11511 BELLINGER ST. LYNWOOD, CALIF.

FOR SALE

1—Colliau Cupola—54" diameter x 40' with Roots blower size 6, used. Address: HANCHETT MFG. CO., BIG RAPIDS, MICHIGAN.

FOR SALE

MOLDING MACHINES
8—13 x 8 Tabor power squeeze flask lift machine split pattern type.
1—International 14 x 8 jolt rollover draw
2—Deuscher Stationary jolt squeeze
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers
BLOWERS FOR CUPOLAS AND FURNACES
10—15 HP Spencer-Turbine 2250 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
1—#47 Connersville-Acme
2—#59 Connersville-Acme
1—Connersville rotary 24 cu. ft. per rev. 6200 C.F.M.
Maxon-Premix Blowers for Gas ¼ to 1 HP
METAL MELTING EQUIPMENT
5—1000# open flame brass melting furnaces, gas fired
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired
New 32" to 41" dia. shell cupolas made to order.
TUMBLING MILLS AND SAND BLAST
1—Pangborn style GJ-1 rotoblast barrel complete with Pangborn style FM automatic loader. Load capacity approx. 16 cu. ft.
1—Pangborn No. 2 GH direct pressure type sand blast barrel, motor driven. Complete unit.
1—Pangborn Sand Blast Unit, including generator tank, shot cleaner, bucket elevator. Suitable for use with room
MISCELLANEOUS
1—Stoney crane type shakeout
1—Dings type M magnetic separator
1—NC-4 sand separator
1—NB-2 sand separator
1—#1 Demmler core blower
2—#16 Roto-clone units complete
25 Tons steel flasks in sizes from 26 x 26 to 60 x 60
4—Heavy Duty Flexible Shaft Grinders 2 HP
Complete stock of rebuilt mill and dust exhaust blowers

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

For Sale

FOR SALE

Herman—6000# series JOLT-STRIP MACHINE 48 x 54 table, 12" draw. Late.
Osborn—JOLT STRIPPER, Model 405, 21 x 53.
Osborn—JOLT ROLL OVER, Model 406, 36 x 24.
Osborn—JOLT STRIPPER, Model 406, 36 x 52.
Cupolas—modern #9 Whiting #8.
R-C POSITIVE BLOWER 12 x 20, 20 hp.
R-C POSITIVE BLOWER 22 x 66, 75 hp.
MIXING LADLES, 1000# cap. to 4000#.
V.C.G.-3 SUPER GYROSET SHAKE OUT, 6' x 8' deck, complete.
(1) #276 J Osborn SQUEEZER MACHINE — large size. Portable.
PKL 12 Int. JOLT SQUEEZE PIN LIFT MACHINE. Portable.
Am. SAND CUTTER, Model AA, #1111, 7½ hp, 220/440 v.
(2) Webster & Perkins PEDESTAL GRINDERS, 1290 rpm.
Everett STAND PEDESTAL GRINDER.
Gardner GRINDER, 52" horizontal, 20 hp. Practically new.
15 H.P. GRINDER.
SNAG GRINDERS to 10 H.P.
AIR COMPRESSOR, Sullivan 11 x 10, 50 HP, AC motor & starter, $750.00 f.o.b.
MAGNETIC SEPARATOR—Ding's Mfg. 12" x 18", 110 V., S. Ph. motor, 2 hp., ser. R 5771, $600.00 f.o.b.
FANS & BLOWERS—up to 125,000 cfm.
ELECTRIC FEED RAILS & TROLLEYS.
HOISTS, Electric, hand, air 1 to 10 ton.
CONVEYORS—all sizes and types.
CRANES—overhead & jib, all sizes.
MOTORS, SPEED REDUCERS, BLOWERS — any size.
AIR COMPRESSORS—from 1 hp up.
FOUNDRY EQUIPMENT. Send us your inquiries.

ALLIED MATERIALS HANDLING CO.
4657 SPRING GROVE CINCINNATI 32, OHIO

FOR SALE

AIR COMPRESSORS

ELECTRIC MOTOR DRIVEN

CFM	Make	Type	H.P.
156	Worthington	M-40	40
327	Sullivan	WL-60	75
350	Ingersoll-Rand	40T9044	75
900	Chicago Pneumatic	Diesel	
1100 (2)	Ingersoll-Rand	PRE-2	200
1400 (2)	Sullivan	WJ3	250
5000	Ingersoll-Rand	PRE-2	800
5600	Ingersoll-Rand	PRE-2	930

SEND US YOUR INQUIRIES!

WORLD'S LARGEST INVENTORY

MOTORS • GENERATORS • TRANSFORMERS

COMPRESSORS

ELECTRIC EQUIPMENT CO.

P.O. BOX 51, ROCHESTER 1, N. Y.

WRITE, WIRE OR PHONE LD 65

FOR SALE

1—5' x 8' Simplicity shake out, D28 A.
1—Type "AA" American Sand Cutter, 6' between wheels, 15 hp Westinghouse motor, 220/440 volt, 3 phase, 60 cycle, 1735 rpm, good condition.
1—Johnston & Jennings, jolt squeeze pattern draw molding machine, Model #2, new, never used.
1—Tabor yoke type jolt squeeze pattern draw for flasks to 36".
1—Beardsley & Piper swingslinger with 5 ton plate feeder for operation with 3 phase, 60 cycle, 220 volts, practically new.
Several Demmler large core blowing machines.

NATIONAL FOUNDRY CO. OF N. Y., INC.
10 SANDFORD STREET
BROOKLYN 5, N. Y.

FOR SALE

1—Centrifugal Casting Machine, model J—Vertical. Mfr. Centrifugal Casting Machine Co., Tulsa, Okla. Capacity mold 24" dia. x 12" high. Motor drive, 440-60-3. Like new. Price $300.00.
1—Centrifugal Casting Machine, Model C—Vertical. Mfr. Centrifugal Casting Co., Tulsa, Okla. Capacity mold 40" dia. x 20" high. Motor drive 440-60-3. 0 to 1000 R.P.M. like new. Price $2200.00.

CLARK EQUIPMENT CO.
BUCHANAN, MICHIGAN

FOR SALE

SPO portable jolt squeezers, cantilever type. Table 20" x 17' cylinder 10" with master vibrator. Model 110J Price—$255.00
Pangborn tumbling barrel type 1 GF capacity, 150 pounds—Price $190.00.
Pangborn suction cabinet 4' x 30"—Price $150.00.
Pangborn sandblasting room size 7' 6" x 5' with abrasive elevator, separator dust collector. Price—$1100.00.
Pangborn 6' direct pressure table with 4 nozzles, 4A 1 generator elevator, 7BVR abrasive separator, table designed to clean 20 MM shells, wheelpeening or shot cleaning. Price—$1000.00.
Pangborn 4' table suction type—Price $200.00.

M. ELSTEIN
141 MANGIN STREET NEW YORK 2, N. Y.

FOR SALE

1 Mulboro, Beardsley & Piper #23671 w/4 Barrows
1 Milwaukee Core Grinder #70-9, 72" Table, 30" Segment Wheel
3 #3 Demmler Core Blowers, Style 3-E
1 #2 Demmler Core Blower, Style 2-K
MOLDING MACHINES:
2 International Pin Push Off, Size #6-8"
2 Champion Pin Push Off, 32" x 36" x 8"
2 Champion Pin Push Off 46" x 46" x 12"
2 Milwaukee Jolt Pin Lift 38" x 32", 1500 lb. capacity, 12" draw.
1 SPO #3102 Stationary Jolt Pin Lift, Inverted jolt, 52" x 38"
1 International Jolt Rollover 27", Type F, 12" draw, Air equalizer & Air flask clamps, Jar plate 64" x 22"
2 Johnston Jennings #682 Jolt Pin Push Off 30" x 38" x 12"
2 Johnston Jennings #815 Jolt Rollover, Jar plate 30" x 40", Air Equalizing draw and Air flask clamps
4 Champion Pin Push Off 21" x 8"

DONOVAN, INCORPORATED
1080 HAZEL AVENUE
ST. PAUL, MINNESOTA
PHONE: VANBUREN 5531

FOR SALE

PANGBORN 6' dia. type "LK" rotoblast table room machine. Complete with #220 type "CK" dust collector.
CRANE, P & H 5-ton, cab operated, AC controls, 26' span with I-beam bridge. Both late models—never used.

FORT MEIGS MACHINERY CO.
105 SEVENTEENTH ST. TOLEDO 2, OHIO
FU 2443

FOR SALE

ELECTRIC FURNACES

Three (3) American Bridge Co. 15 ton Heroult Electric Melting furnaces, side charge.
Each complete with 5000 KVA Westinghouse Transformer, reactor, winches, masts and motors. All parts are in excellent operating condition. Furnaces match-marked and tagged for erection.

HEAT & POWER CO., INC.

70 PINE ST. NEW YORK 5, N. Y.

HANOVER 2-4890

SAND CUTTER—FOR SALE
AMERICAN WHEELABRATOR #79-60"
MODEL "M"
Electric powered—220 volt, 60 cycle, 3 phase safety type head—complete ready to operate, with motors, cable and reel.
Up to date model. Good as new. Contact

NEENAH FOUNDRY COMPANY
NEENAH, WISCONSIN

FOR SALE

1—#6 Fox swing frame grinder, 20" x 2½"—3" x 8" with 15 H.P. motor, 220/440 volt, enclosed, fan cooled, 1750 R.P.M. complete with exhaust booth, hoist and trolley.

ZENITH FOUNDRY COMPANY
1501 SOUTH 83rd STREET
WEST ALLIS 14, WISCONSIN

FOR SALE

Small, well equipped aluminum foundry and real estate within 20 miles of Indianapolis, 7-room modern house suitable for 2 apartments and cement block building. Address: Box 835, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

One (1) Model AG 30" x 30" heavy duty sandblast cleaning cabinet including vacuum-type dust filter, exhaust fan, magnetic starter and 12" barrel with motor. Like new—never used. Address: Box 824, FOUNDRY, Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

FLASKS

Sterling Wheelbarrow Rolled Steel Flasks
18 sets 46 x 50—6" cope, 6" drag
17 sets 38 x 44—6" cope, 6" drag
20 sets 32 x 48—6" cope, 6" drag
18 sets 32 x 48—6" cope, 8" drag
also 21 sets 62 x 41 x 31 Magnesium, 5" cope, 9" drag
2 sets 48 x 32 Magnesium, 5" cope, 5" drag
1 set 28 x 22 Magnesium, 5" cope, 4" drag
CONVEYOR
ALL SIZES AND TYPES

ALLIED MATERIALS HANDLING CO.
4657 SPRING GROVE CINCINNATI 32, OHIO

FOR SALE

American Wheelabrator tumblast, 27" x 36" complete with electrical equipment for 220 volt 60 cycle 3 phase current. Good condition. $3500.00 F.O.B. Tulsa. Address: EMPIRE PATTERN AND FOUNDRY CO., BOX 1647, TULSA, OKLAHOMA.

FOR SALE

Air compressor, Ingersoll-Rand 14 x 12 with V-belt drive. G.E. 100 HP/3-ph/440 V. synchronous motor with direct-coupled excitor and starting panel. A good unit. Address: E. J. FLEMING, JR., 164 BIRNIE AVE., SPRINGFIELD, MASSACHUSETTS.

FOR SALE

100% of the stock in a gray iron foundry that produced 3600 tons of light gray iron castings in 1951. Plant is located 350 miles from Chicago, has dep. book value of $270,000 and has been in operation for the past 32 years. If interested in purchasing this stock for $150,000, write: Box 828, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

100 sets style LD Sterling steel flasks. 22 x 22—6" cope, 6" drag. 24 ¾" pin centers, .640" I.D. hardened bushings, bars in copes.

ZENITH FOUNDRY COMPANY

1501 SOUTH 83rd ST. WEST ALLIS 14, WISC.

FOR SALE

Herman heavy duty jarring molding machine. Ser. #4500, 48" x 54" table, 13" solid cylinder. Independent strippers, 10" cylinders with 12" draw, ser. 4501. Price $3,000.00. Address: THE CHRIS. ERHART FOUNDRY & MACHINE CO., 1237 W. SIXTH STREET, CINCINNATI 3, OHIO.

EQUIPMENT FOR SALE

Spencer multi-stage turbo compressor, catalog #1220, 2300 c.f.m. at 20 ounces per square inch pressure. Complete with Spencer outlet adjusting valve. Motor 20 H.P., 1750 R.P.M., 3 phase 60 cycle 220-440 volts. Serial #39470. Address: Box 834, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Two electric magnetic pulleys, 12" x 24" used. One complete conveyor with 30" belt 30 feet long with magnetic pulley and generator driven by 440. Three phase motors for belt and generator. Address: Box 817, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Tabor 22" x 42" shockless jolt, rollover molding machine with wheels and air clamps. Purchased August, 1950—used one week—clamps never uncrated. A real buy. If interested, write: P. O. BOX 256, WATERVILLE, MAINE.

FOR SALE

1—50" Molders Friend brush type sand conditioner—220/60/3, 15 HP motor, extra brush. First rate operating condition. Address: J. F. QUEST FOUNDRY CO., 900 S. 4th ST., MINNEAPOLIS 15, MINN.

FOR SALE

Cast iron sectional gas fired boiler patterns—with jigs and all tooling and some stock. Very compact unit. Address: Mr. A. Romano, 221 Herbert St., Alton, Illinois.

FOR SALE

1200 steel bands, various flasks sizes. Good condition. Must sell complete stock. Address: G & D FOUNDRY, 406 IOWA AVE., STREATOR, ILL.

FOR SALE

2—24″x30′ Belt Conveyors, 5 H.P. 220/440V. 3ph. 60 cy.

1—Bartlett & Snow Bucket Elevator, 60 ft. high, buckets 5″x7½″x4½″ mounted on heavy chain, 5 H.P. 220/440 V. 3 ph. 60 cy.

1—Bartlett & Snow Chain Conveyor, 58 ft. lg. 6″ wide, 7½ HP. 220/440V.

1—#405-79 Osborn Rollover and Pattern Draw Molding Machine

1—#405 Osborn Rollover and Pattern Draw Molding Machine

1—147-3 Osborn Rockover and Draw Machine, for long jobs.

1—Herman Rollover Molding Machine 22″ cyl 42″x72″ table

1—Herman Bumper ser. #1458, 7000# jolt cap. 40″x58″ table

1—Herman Rollover floor type 20″x42″ 750# jolt capacity

1—Herman Jarring Stripper Molding Machine 40″x72″ table 20″ draw

5—#103-5 Milwaukee Jolt Squeeze Molding Machines

1—#1 Demmler Core Blower—New

4—SB12 International Core Blowers

1—Pangborn 28 cu ft. Rotoblast, Type CK with power loader.

1—Pangborn 12 ft. dia. Tableblast complete with dust collector.

1—Dust Collector, Parsons #118 complete with 20 H.P. motor & blower.

4—Tumbling Mills, 30″x60″ with 15 H.P. motor 220/440V. 3ph. 60cy.

1—10 H.P. Black & Decker double stand grinder 440V. 3-h. 60cy.

1—3 H.P. double stand grinder belt driven.

1—40 H.P. Pennsylvania Air Compressor

1—60 H.P. Ingersoll-Rand Air Compressor

1—100 H.P. Chicago-Pneumatic Air Compressor

1—#5 Cupola

1—#9 Cupola

1—Beardsley-Piper Speedmuller #60, 19 to 38 tons per hour.

1—Beardsley-Piper "Junior" track type sand-slinger

1—Beardsley-Piper Stationary type sandslinger

2—3 H.P. Blowers for furnaces

1—5 H.P. Blowers for furnaces

1—15 H.P. Blowers for furnaces

2—Micromax Instruments Leeds & Northrup Temperature Control.

Various sizes of used steel flasks

Various sizes of Hines Popoff flasks and jackets.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

1509 Saranac Rd., Cleveland 10, Ohio **Telephone—Glenville 1-1538**

CLASSIFIED ADVERTISING RATES

POSITION WANTED — Minimum advertisement set solid, 30 words or less, $2.50. Additional words 9c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $5.00. Additional words 15c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

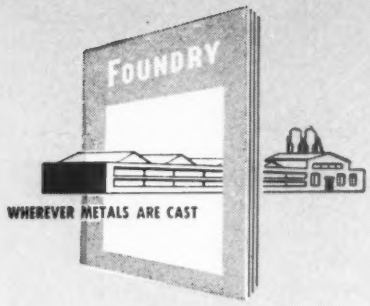
Single Column 2¼″ Wide	One Time	Three Times	Six Times	Twelve Times
1 inch	$ 15.00	$ 13.75	$ 12.50	$ 11.25
2 inches	27.00	25.00	23.00	21.00
3 inches	40.00	36.50	33.50	30.00
4 inches	50.00	46.00	41.50	37.50
5 inches	60.00	55.00	50.00	45.00
6 inches	73.50	66.50	60.00	53.50
7 inches	82.50	75.00	67.50	60.00
8 inches	91.50	83.50	75.00	66.50
1 column	110.00	100.00	90.00	80.00
Half Page	162.50	150.00	137.50	125.00
Full Page	275.00	250.00	225.00	200.00

Remittance should accompany advertisement when submitted—Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

Penton Building, Cleveland 13, Ohio



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Also publisher of STEEL • MACHINE DESIGN
NEW EQUIPMENT DIGEST

Subscription: United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $3; two years $5. Other foreign countries, one year, $10. Single copies 50 cents. Copies published three months or more previous to date of current issue, 75 cents.

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FOUNDRY
PRE-CONVENTION ISSUE

MAY 1952

Mailed to reach foundrymen one week prior to opening of the 1952 Convention. This issue will also be distributed at the Convention.

ADVERTISING FORMS CLOSE APRIL 1, 1952
(Complete Plates)

FOUNDRY
POST-CONVENTION ISSUE

JUNE 1952

Will report in word and picture the convention itself —always an interesting, readable issue.

ADVERTISING FORMS CLOSE MAY 1, 1952

Dear Reader:

Penton Building
Cleveland, Ohio

March has put us in a philosophical mood—like Doc Lee. We've been talking with job applicants much of late. For the most part they have been those to whom the foundry industry is as new and strange as it was to ourselves a generation ago.

The trouble with us old-timers is that we take this wonderful foundry industry which has provided us with stimulating and rewarding employment too much for granted.

Last year, foundries (you) produced 19,000,000 net tons of castings (gray iron, 15,000,000; steel, 2,000,000; malleable, 1,000,000; nonferrous, 1,000,000). This represents production at the rate of 76,000 tons a day.

Value of foundry production last year was $5 billion.

For materials used in production, the nation's foundries (you) wrote checks totaling over $2 billion.

You spend $1,000,000 an hour for supplies!

In short, things are happening in this great industry and it is downright satisfying to present the foundry industry to young men and women of promise at a time when they are setting stakes for the future.

Frank Greifenstein

Richard J. Strnad

We want you to meet two capable young men who have been "first string" on our FOUNDRY team for the past ten years. Frank Greifenstein has handled production for us until his resignation recently to go into business for himself. Dick Strnad moves up the ladder with important responsibilities for directing the production of each monthly issue of FOUNDRY.

Bernice Lou Plumer

Mary Jane Kimpel

Many of you already know our Mary Jane Kimpel (Manager of our Classified Advertising Department). We've wanted to have you meet her "in person" for some time. Here she is! Here, too, is another personable young lady who comes to the advertising staff with experience and a Purdue sheepskin—Bernice Lou Plumer.

Donald T. Fowler

James M. Bugbee, Jr.

Eyes on Texas! Donald Fowler has recently been named advertising manager of Baroid Sales Division, National Lead Co., Houston. Mr. Bugbee has been transferred to the advertising department of Baroid to assist in the preparation of the firm's technical publications.

Cordially yours—**FOUNDRY**

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You brought him back alive...

Out of every 100 wounded American servicemen who reach the most forward hospitals in Korea, 97 are being saved.

If that sounds like a statistic, remember that it's based on flesh—and blood. *Your* blood.

Among the 97 that your blood can bring back are such statistics as the tall, skinny kid on the block . . . the husband of that woman you met in the grocer's . . . or someone with the same mail address as yours . . .

Today, your Armed Forces are short 300,000 pints of blood a month. Precious reserves of blood and plasma are vanishing at a desperately dangerous rate.

We tell you this because we don't think you have to be coaxed or coerced into giving blood. We think that you just haven't realized how serious the situation is.

So make your date today. And *keep* it! You'll find yourself in swell company . . . everyone is rolling up his sleeves these days, from the milkman to the mayor.

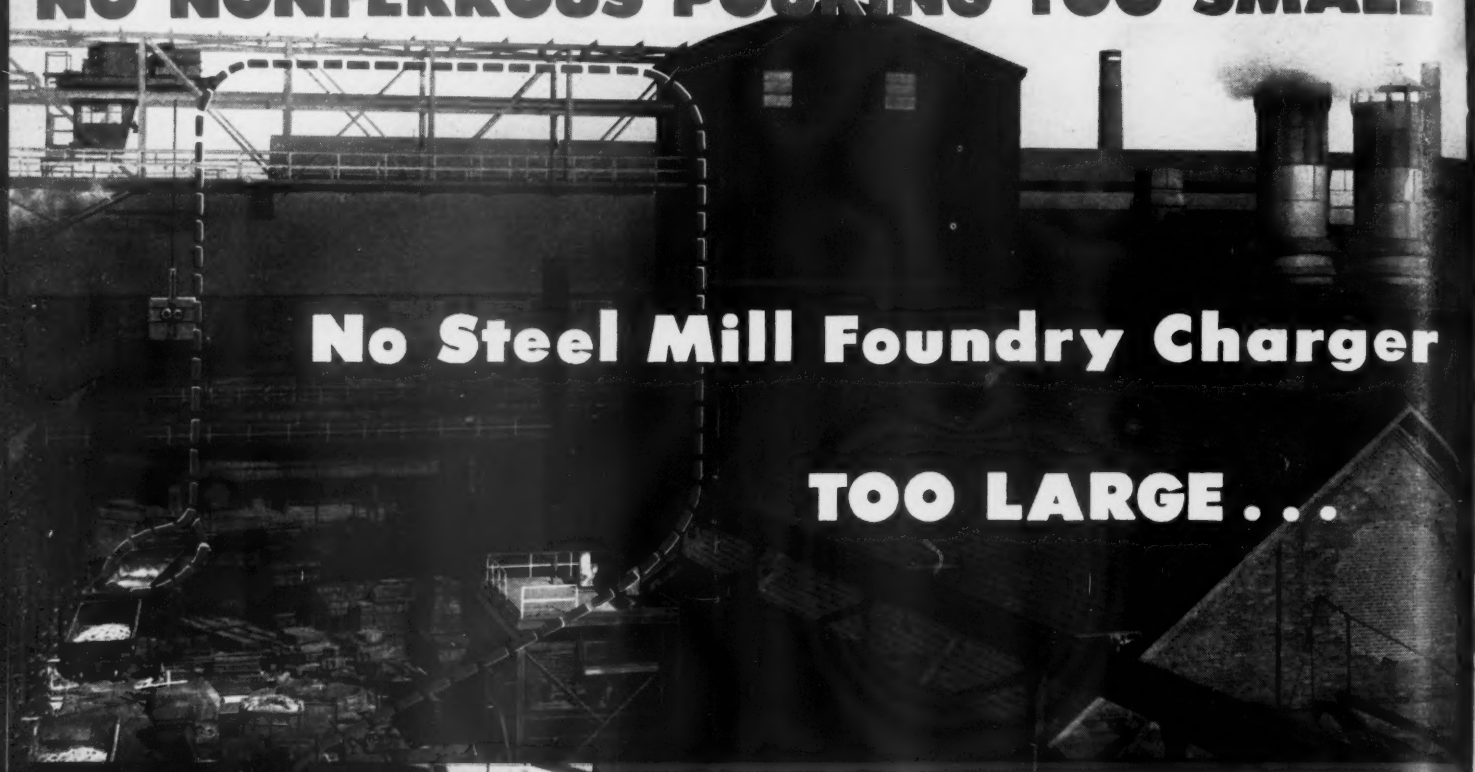
Get on line with them now . . . the blood you give today saves someone's life tomorrow!

ARMED FORCES BLOOD DONOR PROGRAM

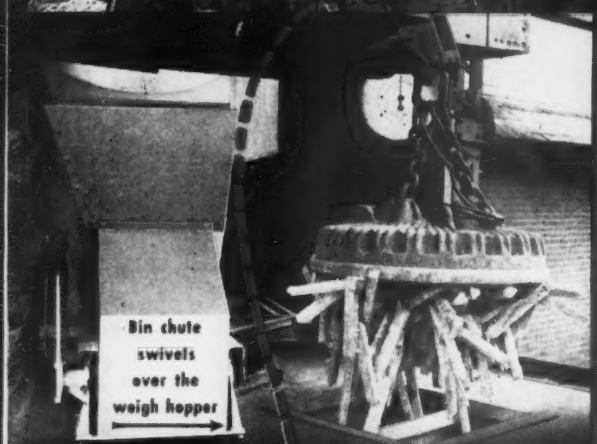
CALL YOUR RED CROSS TODAY!

What Happened to That Pint of Blood You Were Going to Give?

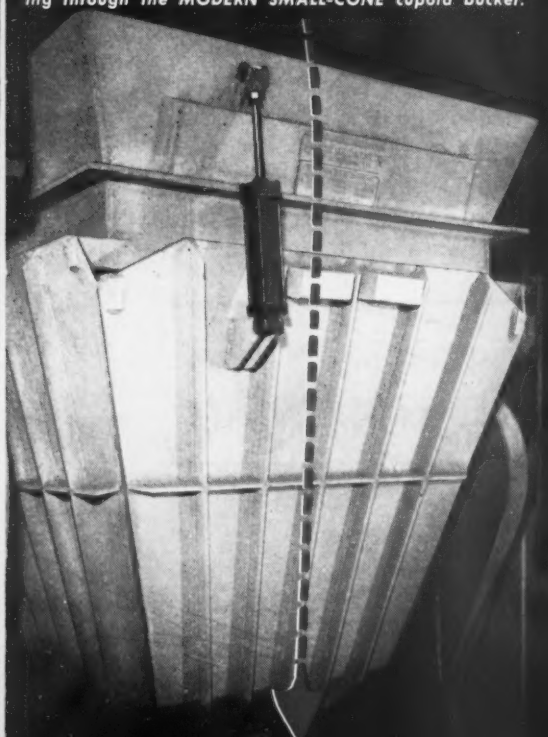
NO NONFERROUS POURING TOO SMALL



No Steel Mill Foundry Charger TOO LARGE . . .



Coke and stone, unloaded by a MODERN crane and gravity fed to a MODERN weigh hopper simplifies charging through the MODERN SMALL-CONE cupola bucket.



WORKING TOGETHER with practical foundrymen MODERN engineers pioneered mechanical pouring in the small foundry. Then all down through the years for more than thirty years one outstanding achievement blazed the way for another and a tougher job. . . .

Typical of the range and flexibility of today's mechanical charging is this 100% MODERN system shown in operation here. Coke and stone, from gondola cars, flows to cupolas without interruption. Every operation from MODERN yard-crane to SMALL-CONE SIDE-DISCHARGING bucket has been synchronized to reduce handling cost and further boost the temperature of metal poured.

More complete details will be mailed on request. Just return the coupon for catalogs or free loan of MODERN sound, color, motion, picture films. . . . .

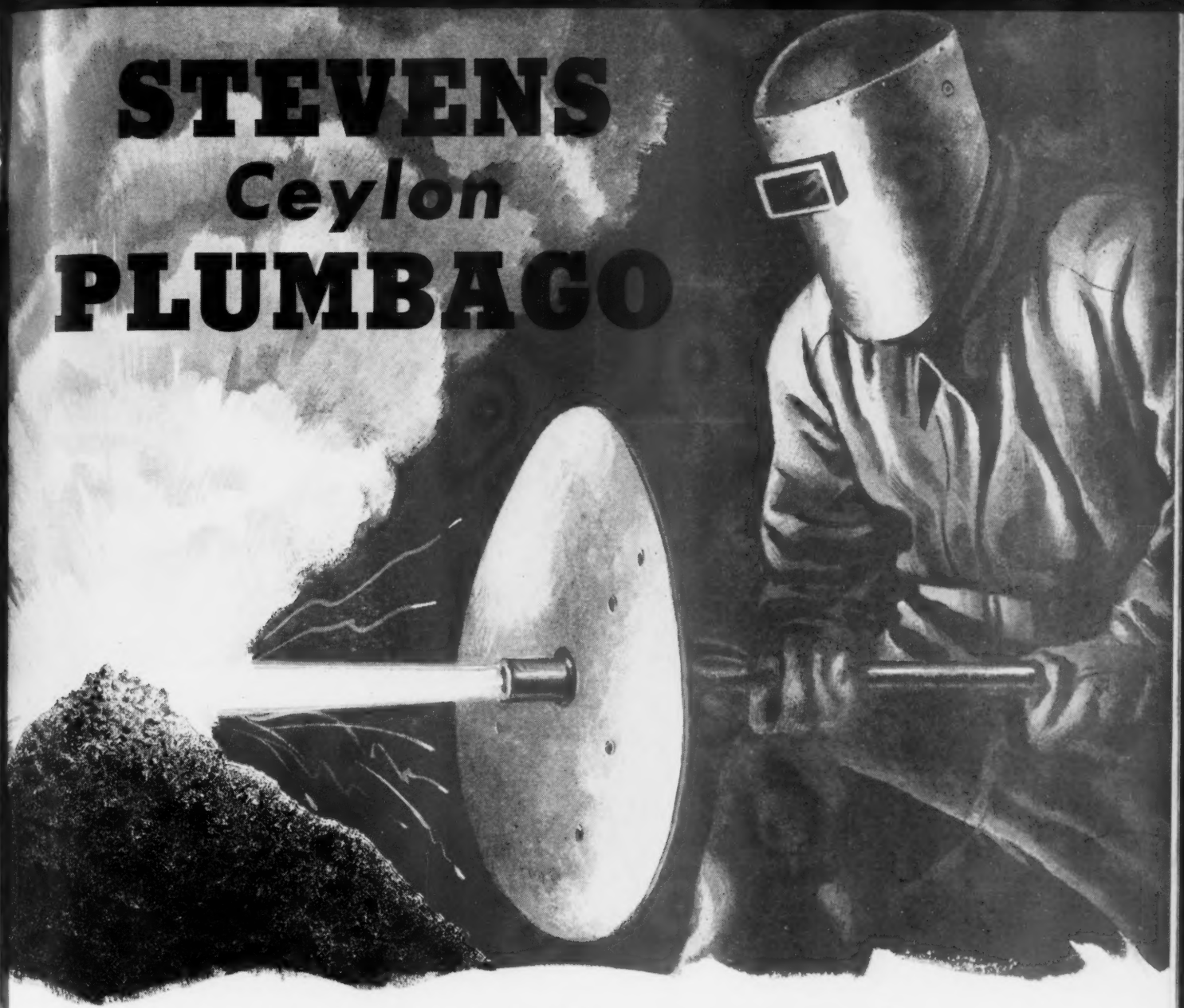
MODERN EQUIPMENT CO.
PORT WASHINGTON, WISCONSIN

MODERN EQUIPMENT COMPANY
Dept. F-4, Port Washington, Wisconsin
Without cost or obligation mail:

Catalog on metal pouring systems		☐
Cupolas and cupola chargers	147A	☐
Cranes and monorail systems	150	☐
More information on FREE use of MODERN films		☐

Company .....
Street ..... Zone .....
City ..... State .....
Individual .....

STEVENS Ceylon PLUMBAGO



FUSION POINT UNKNOWN!

The hottest blowtorch ever devised (temperature of jet: 5500° F.) wouldn't melt Stevens Ceylon Plumbago. According to the International Critical Table, Plumbago can withstand heat greater than 6300° F. Is it any wonder Stevens Plumbago is a foundry favorite?

It can be used dry as a mold coating—can be mixed with molasses water and used as a mold wash—can be added to core washes to increase heat resistance—can be used as an additive to sand to make it easier to ram and give a heat resistant coating on each sand grain.

Let us show you how Stevens Plumbago can help improve your castings. If you will send us the data on your particular type of operation, we will make our recommendation and send you a working sample of the grade best suited for your requirements. Or, better still, order on approval a barrel of the grade we recommend. If it does not give full satisfaction, return it for full credit.

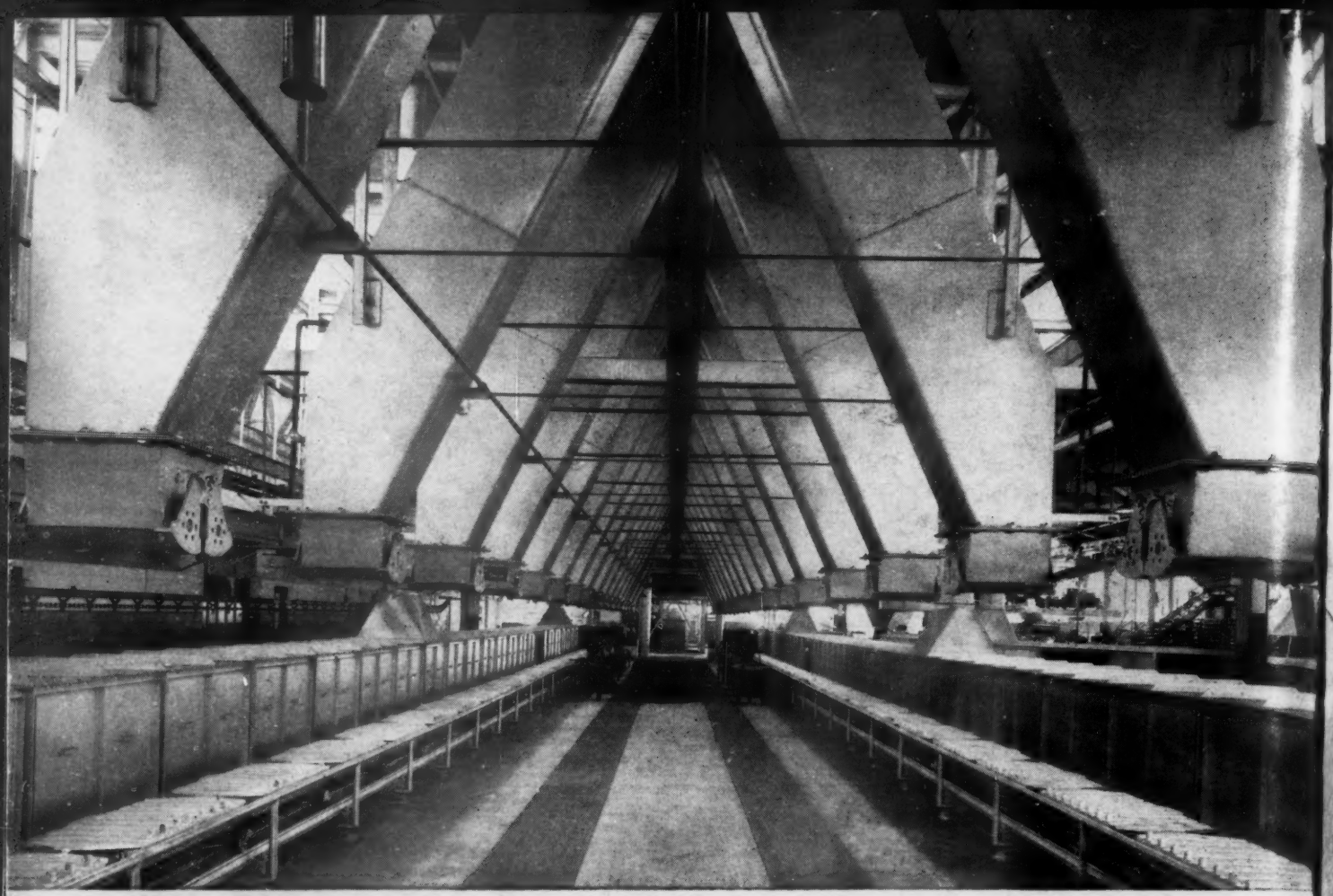
Visit our exhibit at the
International Foundry Congress and Show,
Atlantic City, May 1-7, 1952
BOOTH 1718

"EVERYTHING FOR A FOUNDRY"
TRADE MARK

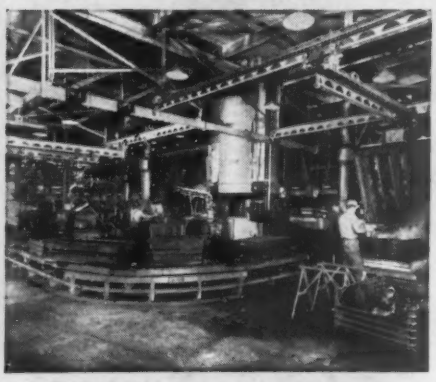
FREDERIC B. STEVENS INCORPORATED
DETROIT 16, MICHIGAN

BUFFALO • CHICAGO • CLEVELAND
INDIANAPOLIS • NEW HAVEN
Representatives in Other Principal Cities

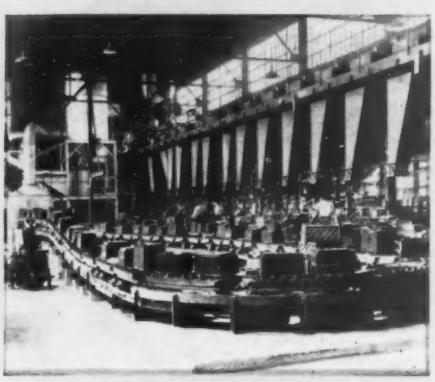
FREDERIC B. STEVENS OF CANADA, LTD.
WINDSOR • TORONTO
ONTARIO



Above: Molder's Hoppers and Continuous Mold Conveyors in Large Mid-Western Foundry.



Sand Slinger Molding Unit Showing Continuous Mold Conveyor and Side Wall Shakeout.



Mechanized Jobbing Foundry Equipped with Car Type Mold Conveyor.

Mechanization

benefits everyone

● Mechanization synchronizes and coordinates all operations in the foundry. It minimizes bottlenecks, delays and lost time. Output per unit of floor space is much increased. Lost molds and reject castings are much reduced. Foundries become better, cleaner, healthier places in which to work, attract a higher grade of workmen. Labor turnover is reduced and casting costs are cut, sometimes by as much as 33⅓%.

Consult Bartlett-Snow, engineering specialists in mechanizing continuous production and jobbing foundries since 1914. The C. O. Bartlett & Snow Company, 6201 Harvard Avenue, Cleveland 5, Ohio.

DESIGNERS ENGINEERS

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